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The Unity Of Professional Engineering

MUST BE MAINTAINED

If It Is To Survive As A Profession

Probably no decision, affecting the practice of engineering, has received such widespread publicity and editorial comment within the profession as has the recent pronouncement of the Illinois Supreme Court declaring the license law of that state unconstitutional. In general there has been expressed no substantial difference of opinion as to the justification of the Illinois decision. The Court has made its ruling sufficiently clear to warrant not only understanding but appreciation of its criticisms. Nor should engineers regard the decision as surprising; for many within the profession have for years pointed to these very defects and urged correction of the same. That the verdict rendered in no way questions the propriety of, or need for, licensing serves but to confirm the opinion that the policy of regulating the practice of engineering is a sound one, definitely in the public interest.

In view of the fact that engineers in Illinois are preparing new legislation to replace the invalid act, an editorial appearing in the Engineering News Record of December 28, 1944 calls for comment. The said editorial, after setting forth the grounds on which the Illinois law was declared invalid and drawing attention to the similarity between the said law and those of other states, makes certain recommendations. With the review of the court ruling, as well as with the general relevance of the same, there is little room for disagreement, but with the proposal that engineering should be reduced in scope and legally divided with limited licenses issued for each of the major subdivisions, one must take sharp issue and in so doing plead for a united front against any effort so contrary to the interests of both public and profession.

Does the Engineering News Record seriously contend that it is practicable to adequately phrase half a dozen or more definitions to cover branches of a profession which to date has not been satisfactorily defined as a whole? Who would write the definitions covering the various subdivisions? Would mechanical and electrical practitioners, for example, agree on definite and separate fields for their endeavors? Would one separate the design of engines or machines into mechanical or electrical practice, according to whether they function with the aid of steam or electricity? If so, within what field would machines run by hydraulic power fall? Would the design and installation of an elevator system in a multiple story building constitute structural, mechanical or electrical engineering? It involves all three, and its location and capacity probably fall within the province of architecture. A hydro-electro development is an illustration of a project involving well nigh every engineering subdivision, branch or specialty catalogued, taught or practiced. Would a dozen different chief engineers and staffs be required to legally plan, design and construct the same? If so, who would assume responsibility for the project as a whole—a layman?

If architects and engineers, in some cases, have had to compromise differences concerning the fields of their respective professions by legally permitting members of either calling to practice both professions, how in the name of common sense can lines of demarcation be drawn between the numerous branches of engineering, all of which spring from the identical premises. When one encounters sharp differences of opinion as to where engineering ends and medicine begins in matters of sanitation, where engineering concludes and law enters in the preparation of contracts and property descriptions or where engineering becomes accounting in matters of costs and utility evaluations, what could possibly result from an attempt to legally divide engineering itself into subdivisions of practice—other than confusion compounded?

Difficult as would be the attempt to draw arbitrary lines between, and to establish definitions for, five, six, seven or more branches of engineering, conceive, if one can, of the problems incident to the enforcement of the several pertinent license laws involved. Were there separate license acts relevant to the various branches of engineering, no enforcement could possibly be hoped for and such laws would soon have to be repealed in the public interest.

It should be borne in mind that in advocating a single practice act unification of the profession is but one of the aims in view. Equally important is the realization that confusion and dissension would be inseparable from attempts to make distinct professions or fields of practice out of what is fundamentally one as is a profession that lists specialists for every part of the human body or one which differs with every community, state and nation under the sun. The protection of life, health and property would be hindered, not helped.

In the opinion of this Editor, the engineering license laws and registration acts in practically all states should be rewritten. However, it is not the premise that engineering is a single profession that needs revision, but rather the lack of definitiveness of the terms used and the methods of qualification permitted that furnish the Achilles heel of existing registration acts. The purpose of licensing and the justification therefor, as well as the right to regulate the practice of professional engineering, are not now, nor have been, in question. It is the methods of engineers and their slavish adherence to the practices of the technical societies as opposed to those of other professions that need revision.

The Illinois Court has rendered a real service by resolving the differences of opinion that prevail within the calling concerning the so-called Model Law, which this publication has many times pointed out is not a model but merely a set of minimum requirements with which to initiate legislation. Most of the serious defects of the Illinois act can readily be corrected by using the laws regulating the practices of other professions as the basis upon which to formulate engineering legislation. It scarcely needs a court decision to suggest that laws should be specific concerning the requirements of qualification and the rights of individuals, and, that the authority granted to boards of examiners should be restricted to the examination of candidates within the limits imposed and the standards established by the Act itself. It is not a reflection on any board or any person to point out that no opportunity for arbitrary or capricious actions or ephemeral opinions should be present in a license law. Neither does it require great argument to suggest that all candidates must pass the same examination to justify licensing as professional engineers. Such examinations must be uniform and should ignore specific reference to subdivisions as permissive requirements or selective fields of examination for qualification. A license does not contemplate that the individual is a specialist or an expert; it is merely a certification of character and of the fact that he has given evidence, through examination, that he possesses a thorough understanding of the basic sciences and principles involved in the practice of the calling. This is true in all professions.

So far as definitions are concerned, the best and only sound legal description of a professional engineer is in effect—"One licensed to engage in the practice of professional engineering in accordance with the law of the state." Anything more is redundant and serves only to confuse. Perhaps one will suggest that there still remains the question of what constitutes professional engineering. It is not, however, professional engineering, but the *practice* thereof, which must be defined by registration acts. When this is fully appreciated, the task of describing and limiting the field that involves the protection of life, health and property can be more readily accomplished.

As previously stated, some of the comment of the Engineering News Record editorial is very much to the point and constructive, but its suggestions regarding licenses for the major subdivisions of engineering are impracticable and contrary to public or professional interest. It is to be hoped that engineers will act as a unit, to preserve the unity, and prevent the disintegration and demise, of their profession. The National Society of Professional Engineers is founded on the basis of engineering as a single calling recognized by statute. Without adherence to this principle, engineering can not hope to achieve recognition as a profession.

THE VANISHING AMERICAN

SOME TRENDS AND PROSPECTS

CONCERNING THE AMERICAN PATENT SYSTEM

ENGINEERS HAVE MUCH AT STAKE

SHOULD DEVELOP GREATER INTEREST

BY HARVEY R. HAWGOOD

HARVEY R. HAWGOOD, *Chairman N.S.P.E. Patent Committee*

The author, an attorney as well as an Engineer, is Chairman of the Patent Committee of the National Society of Professional Engineers. He is a member of the bars of the Supreme Court of Ohio, the courts of The District of Columbia and the United States Supreme Court. He was also admitted to practice in Canada prior to the limitation of such to subjects of the King and has served the Cleveland and American Bar Associations as well as having been Chairman of the Ohio Society of Professional Engineers Committee on Violations.

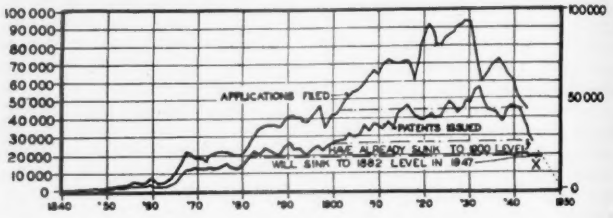
When this terrible war is over and industry has had an opportunity to reconvert, everyone is going to have lots of new conveniences and luxuries, which will come out of the great inventions resulting from the all-out efforts of our wonderful Yankee ingenuity. That thought in substance has been expressed frequently of late, and at times one is almost tempted to believe that only shortage of material and manpower is holding back a flood of consumer goods inconceivably superior to those with which we were acquainted before the war. But if one has the temerity to suggest that much of the current development is along lines which have no general application, such as by inquiring who wants a surplus robomb anyway or by pointing out that the jeep is far inferior in riding qualities to the pre-war car, one gets "told off" about all the "wonderful new developments" which have just been held in abeyance for the duration.

A discordant note appears occasionally, as when the Alien Property Custodian's office comes out with a rather querulous statement to the effect that although it has reduced license fees from $50 to $15, it does not find any substantial number of takers of the "great foreign developments" which have been confiscated.

The public looks to our engineers and inventors to furnish all the wonderful new things now vaguely hinted at, and which will so sorely be needed, both for replacement of worn-out equipment and to prevent unemployment, but is the time of our applied scientists being fully occupied in creating engines of destruction? Or do they have an opportunity and incentive to prepare those things which will be required for reconversion?

Our only authoritative guide is our patent system. All important inventions—and many of minor significance—are patented, so that the numbers of applications filed and of the patents actually issued furnish a reliable index.

This index for a period of over 100 years, when reduced to a chart, looks thus:



A CENTURY OF INVENTION

From these curves it is evident, from the infancy of our system over 100 years ago, the number of applications filed increased at a steady, almost constant, rate of about 1,000 yer year, reaching a maximum of 94,738 in 1929, and only slightly less in 1930. At the same time the number of patents issued, of course being somewhat less than the applications filed, increased at an even more uniform rate of slightly over half a thousand per year, reaching a maximum of 56,415 in 1932.

The curves naturally show some fluctuations from a straight line, as, for instance, the dips between 1860 and 1870, at 1898 and at 1918 coinciding with the Civil, Spanish-American and First World Wars, respectively, each of which was followed by a peak carrying the number of both applications and patents to heights far beyond any which has previously been reached.

It will also be apparent that the patent curve lags behind the application curve by several years, representing the average time required, at the particular period, to prosecute the applications through to allowance as patents.*

This lag makes it relatively easy accurately to forecast the number of patents which will issue within the next few years, as these will be the result of applications which already have been filed.

**Sources of Information:—Statement of Commissioner of Patents, Conway P. Coe, before the Temporary National Economic Committee January 16, 1939. Official Gazette of the United States Patent Office, Volumes 474 to 563.*

What has Happened to the Upward Trend?

But a glance shows that the early part of the 1930 decade marked the end of a trend which had continued for 100 years.

Not only was the decline in the filing of applications about three times as great as any previous decline (the largest preceding one being at the time of World War I) but, unlike former ones, it was not followed by an increase carrying the new inventions to unprecedented heights.

On the contrary, it was followed only by a relatively feeble recovery, reaching only substantially one-third the height of the preceding decline, and which was spread out over four years. The rise was only about half as much as that after World War I, much less than that following the Spanish-American War, and roughly equal to that following the Civil War.

Then the number of applications again declined precipitously to far below the bottom of the dip of the early '30's to approximately 46,000 applications in the year 1943—the lowest point to which applications have fallen at any time since 1900.

The number of patents issued per year dropped from a maximum of 56,415, its all time high, to 33,303 in 1943, and, from the records for the first half of this year, it is obvious that 1944 will see a further shrinkage of at least 2,000. A glance at the chart shows the current low number of patents issued has also declined below any point since 1900.

Not only has the status of invention in this country been set back to the equivalent to what existed at the dawn of the century, but the decline in the patents issued (following the applications) will continue for at least three years more, so that we can continue the patent curve by extending it parallel to the application line to 1947 with fair assurance of its accuracy. This brings us to point X on Figure 1, which shows that we can only expect the number of patents issued to decline to substantially what they were in 1881 or 1882.

If the trend were to continue only a few years beyond point X, it could forecast that American invention will have been completely snuffed out by 1951. Certainly, we can hope that we will not have to follow this downhill path below the 1882 level.

The startling slump in the number of inventions actually produced contrasts strikingly with the cheerful generalities about the many and wonderful new things to come.

What is Strangling Invention?

The decline obviously is not a product of our being in the war, inasmuch as the decline started ten years before our involvement therein.

It is not due to the Patent Office falling behind in its work, because the total number of cases awaiting action in the Patent Office as given by the Official Gazette of January 5, 1942, was 87,952, while in the Official Gazette of June 6, 1943, only 45,634 applications were shown awaiting action. The Patent Office actually caught up by nearly 50% in its unfinished work in these years.

Inasmuch as the patents now issuing are the result of applications filed at least three or four years ago, our entry into the war cannot as yet be reflected in the patent curve, but only in the last three years' figures for the application curve.

Certainly, there has been no mental deterioration on the part of our engineers, nor any atrophy of the constructive impulse. What then has produced this violent slump in American invention?

Recent legislation both proposed and enacted, judicial decisions in various suits involving patents, and the action of the examining corps of the Patent Office all have their impact upon the inventor, upon the manufacturer, and upon engineering and research organizations.

General business trends also enter the picture whenever one considers the advisability of the expense of obtaining patent protection or placing articles upon the market.

Legislation

During the period of the first decline, in the early '30's, there was no patent legislation of particular significance, but this will be remembered as a period of broad and general legislation, such as the N. I. R. A., which probably affected patent property only as it did other kinds of property. However, on the second long-down-hill grade, starting after 1937, we find a continuous series of bills introduced in Congress.

These start at about the end of 1937, with the MacFarlane Compulsory Licensing Bill (H. R. 9259 of the 75th Congress), designed to cut down the period of the patentee's exclusive right to control his invention from seventeen years to three. (Figure 2 omitted).*

Many of our engineers and engineering societies participated in the howl of protest from those who were interested in technological progress, and which protest stopped this bill in the House Committee.

Upon the heels of this bill, however, followed the Temporary National Economic Committee, with its scattered hearings, advantage of which was taken by some of the witnesses as a sounding board for such statements as "holding hands with Hitler" and "nearly treason" fulminations which obtained their narrators widespread publicity.

The old single court of patent appeals proposal and the bill which would limit the life of patents to twenty years from their filing date, irrespective of the time wasted by the Patent Office in their prosecution, were dusted off, but in spite of hearings, which were so set as to fail to afford the engineering organizations any opportunity to be present, these bills never reached the floor of the Senate.

In August, 1939, three bills were actually enacted,

**Source of Information: — Statement of Commissioner of Patents, Conway P. Coe, before the Temporary National Economic Committee, January 16, 1939. Official Gazette of the United States Patent Office, Volumes 474 to 563, also, United State Code Congressional Service — West Publishing Company. Various Bills and Reports of Congressional Committee printed by Government Printing Office.*

known as the Acts of August 5th, 7th and 9th, 1939, respectively, each depriving the inventor of some part of the protection he had previously enjoyed.

The first cut down, from two years to one year, the time in which an inventor must file his application after his invention has been published, put into public use or been put on sale, and imposed a one year limitation on the copying of claims for the purpose of interference, this being binding upon the inventor even though the one whose claim was copied might have derived the invention from him.

The second Act permitted the Commissioner of Patents arbitrarily to reduce the period in which the applicant must respond to an Office Action from six months to any period not less than thirty days.

The third act abolished renewals, a form of continuing application which had been in use for many years to correct errors discovered in an original application after it has been allowed and also to offset hardship where the inventor (as frequently happened during the depression) was unable to pay the final Government fee within the six months allowed.

Although during 1938 and 1939 there was a slight tendency to arrest the decline of applications, after two years of incessant hammering and the passage of the three acts, the number of applications filed went into the steepest nose dive of the past ten years. In 1941 and 1942 the precipitousness of this decline again tended to flatten out slightly. Immediately appeared the first of the Technological Mobilization Bills (S. 2721) which proposed the regimentation of all engineers and other technological people, together with their ideas and inventions, and has since been superseded by S. 702. Both of these bills have been universally condemned by engineering societies, both local and national, and hearings on them have been held suddenly, without notice, and have afforded an opportunity for only their extremist proponents to sound off, while all who asked to be heard on the behalf of the engineering societies have been refused this opportunity, as have the representatives of the Patent Law Associations.

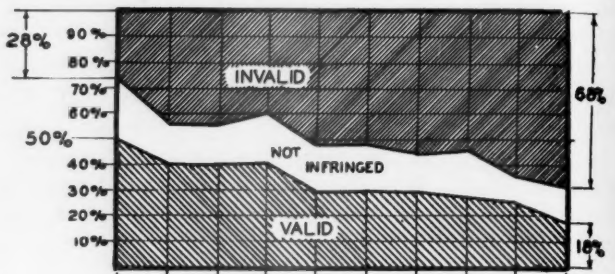
Hence, we are now at the end of another three years of unremitting attack, and whether the curve of inventions will take another dive remains to be seen.

From the above, it will be apparent that the entire result of legislative endeavor during the period between 1934-1944 has been destructive in its character, the only net result being the passage of three acts, each of which gnaws away some part of the foundation upon which the inventor might hope to build a new business.

Litigation

What has been the attitude of the courts through this period? A review of the reported decisions of the various Federal Courts shows something of an increase in litigation during the first part of the period and a slight decrease during the latter part.

Dividing the Court Decisions into three categories, namely:—(1) those in which patents have been held valid, (2) those in which all patents have been held invalid, and (3) those in which the Courts have not felt it necessary to decide on validity, but have said that in any event the patent was not infringed, and reducing these figures to percentages for ease of comparison, we arrive at the chart indicated from which it appears that for the ten years last past the percentage of the cases in which patents are held valid has continuously decreased, from almost exactly 50% at the start of this period to 18% at the end thereof.



TREND OF COURT DECISIONS

The number of patents which have been held invalid has, in the same period, increased from slightly over 28% to almost 68%.

Source of Information:—Federal Digest, West Publishing Company.

The intervening band, in which validity was not determined, has not made any significant change, but shows some fluctuation from year to year.

In other words, the holdings of validity have shrunk substantially 74% in a period of ten years.

If this trend continues at its present rate, namely:—6.4% less patents held valid each year, it means that, in between four and five years, (by 1948 or 1949) we will reach a point where the Courts will not hold any patents valid whatsoever.

Here, again, fortunately, we are justified in hoping for a change in the trend, rather than a continuation to an absolute zero of validity.

Why Inventors Turn Gray

From the above it is apparent that there is a definite trend in both legislation and litigation to deprive inventors of the compensation they hope to obtain through patent protection.

However, many are fortunate enough to avoid being involved in litigation, and many are not particularly close to the legislative part of the picture.

But *all* who seek protection must file and prosecute their applications through the Patent Office.

Consequently, the attitude of the Patent Office, expressed in allowing or rejecting the inventor's claim for his invention, has a much more far reaching effect, and one upon many more persons than do the court decisions or the attempts at legislation.

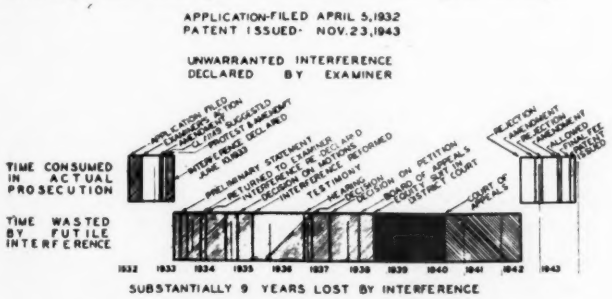
Unnecessary delay, purely technical rejections, requirements of division, and more recently dual prosecution—where the applicant is subjected to cross fire by two or more Examiners—all tend to irritate the inventor, to waste his time and energy, and to discourage him from producing further inventions and improvements.

The Patent Office is very prone to refer to the "long Pendency evil" and to look with favor upon legislation which will decrease the time allowed applicants or will limit the types of actions which an applicant may take.

It has gone on record as favoring the twenty years bill of S. 2688 and similar bills, and sponsored the legislation resulting in the Acts of August 5, 7, and 9, 1939.

The inventor, on the other hand, does not generally share the view of the Patent Office that he, and he alone, is responsible for all the evils of long pendency. In fact, he generally is of the opinion that he is doing his utmost to get his patent allowed, and that he is being impeded and thwarted in this endeavor by hyper-technical impediments thrown in his way by an Examiner who either cannot understand the invention or is trying to make a game out of finding out how many objections and rejections he can devise.

As an example of what gives rise to the inventor's frame of mind, here is submitted a chart giving the case history of one patent application which was involved in an interference and subsequent court appeal, on subject matter which has been consistently held unpatentable, and which the inventor himself pointed out to the Examiner was not what he was trying to patent. The proceedings occasioned him substantial loss of time and expense, chargeable solely to the Patent Office and its unnecessary and wholly futile interference proceedings.



CASE HISTORY OF PATENT

The chart presents the case history of a patent issued to Charles H. Schurr, assigned to The Lees-Bradner Company, on November 23, 1943, Patent No. 2,335,215, its having been issued on an application filed April 5, 1932, Serial No. 603,366.

The patent contains a single narrow claim to a relatively minor improvement on a prior invention of the same inventor.

The time consumed by the Examiner and by the various proceedings which he instituted have all been cross-hatched, while that taken by the applicant in answering the Examiner's objections and rejections are indicated by white portions of the chart.

The application started conventionally, being filed April 5, 1932, and acted upon by the Examiner on August 23 of that year. His action was a conventional rejection, followed by an amendment by the applicant and a second rejection by the Examiner on March 9, 1933, suggesting five claims for interference.

This indicated that one or more of the pending applications also claimed applicant's invention and that the Examiner would declare an inter-party proceeding to call for proof as to who was the first inventor.

Applicant recognized these claims as covering subject matter in his patent issued several years before (Patent No. 1,642,179—September 13, 1927).

Seeing that the Examiner was mistaken in the claims suggested, the applicant's counsel made a special trip to Washington, pointed out the prior patent and protested the interference.

Upon Examiner's insistence that the interference go forward, applicant, having no choice but to make the suggested claims or be held to have admitted that they belonged to one of his adversaries, inserted them by amendment, pointing out that he made them under protest and that they were not patentable.

The Examiner declared the interference on June 10, 1933.

After a period of motions, the Examiner's claims were dismissed on February 11, 1935, the decision sustaining the applicant's contention that the subject matter was that of his old 1926 patent.

On June 18, 1935, the Examiner reformed the interference and the proceedings went forward, involving testimony in different cities, taking several weeks, and filling 2,000 printed pages.

On January 7, 1937, a decision was rendered, and, upon appeal to the Board of Appeals, another decision was handed down on March 24, 1938, both again sustaining applicant's contention that the subject matter was that of his older patent.

Various motions followed, as did a suit to compel issuance of a patent in the District Court of the District of Columbia. This was finally settled, the application returned to the Patent Office, and on June 2, 1942, the Examiner resumed his prosecution with another rejection.

After two more amendments, the patent was issued on November 23, 1943.

The time between the filing of the application and its issuance was eleven years, seven months, and eighteen days.

However, only 2 years, 6 months, and 26 days of this time was consumed in actual prosecution, and of this, the total time taken *by the applicant* in answering the objections was 1 year, 9 months, and 25 days.

Now, when an applicant knows that he has consumed less than two years in responding to the various objections of the Examiner, when he has been put to literally thousands of dollars expense through an arbitrary and perfectly futile stand of the Patent Office, one which he at the outset tried his best to eliminate, and knows that his position has been universally upheld, he does not readily accept all the blame for the long pendency of his application.

You can easily fill in his reactions.

The practice of harassing inventors and putting them to needless expense sometimes forces abandonment of worthwhile inventions and certainly does little to carry out the Constitutional injunction to promote science and the useful arts.

(*Continued on Page* 26)

PROFESSIONAL DEVELOPMENT OF THE ENGINEER

AS RELATED TO REGISTRATION

INCREASED STANDARDS OF PREPARATION

APPRECIATION OF NEED FOR PROFESSIONAL UNITY

AND GREATER SENSE OF PUBLIC RESPONSIBILITY

INDICATE APPROACH TO OBJECTIVES

BY CARL L. SVENSEN

CARL L. SVENSEN
Past President
National Council State
Board of Engineering Examiners

The address published herewith was delivered at the Tenth Annual Convention of the National Society of Professional Engineers in New York on December 2, 1944. Dr. Svensen is Past President of the National Council of State Boards of Engineering Examiners and his views, especially those dealing with the unity of the engineering profession are most timely. That good progress toward the objectives of Registration is being made, is the definite opinion of one who is in a position to pass judgment.

"It is singular that so little interest should heretofore have been taken in the history of those to whom we are indebted for the arts and inventions best promoting the comfort and elegance of life. Although much has been done, more remains to be accomplished. This new world is to be a theatre of mighty structures for the development of resources, advancing, beyond present conception, the welfare and happiness of our race."

This introduction which points to the development of the engineer and of engineering was not written for this address. Nor was it written in recent years but formed a part of the preface to a book by that early American engineer Henry Howe published in 1846. The title was "Memoirs of the Most Eminent American Mechanics."

It indicates a sense of the relation of the engineer to society and a certain pride in the engineering achievements of that time, while anticipating great developments to come in the future. And so it is that the engineer of every year has developed a forward looking philosophy—of expecting greater achievements and of searching all that is available in science, in materials, and in methods to bring about still greater progress.

The professional development of the engineer as related to registration is well exemplified by this Tenth Anniversary Meeting of the National Society of Professional Engineers composed exclusively of registered engineers—a society devoted to the professional development of all engineers regardless of the branch in which they may practice.

Thus we see this Society as an important factor in the development of the engineer. It is a factor directly related to registration. But this is not one-sided for registration owes much to the N.S.P.E. It is after registration that the N.S.P.E. enters the picture in a big way and provides the machinery for the development of the engineer *"professionally."*

A century or more ago the individual engineer could understand and apply all the known principles of engineering. He could know what science had discovered and could work out the adaptations for use in civilian or military engineering. He was in many ways a scientist, a mechanic, an inventor, and a constructor, with a mental grasp of available knowledge which enabled him to do many kinds of engineering.

With the development of steam power and of electricity, the developments of the age of steel, the developments of the machine age, and the applications of marvelous scientific advances, there have been wrought great changes in the everyday life of all the people. Thus it is that engineering has developed from the simple practices of not many years ago to the complexities of the present with greater changes and advances in the last one-hundred years than in all the years before. All of this progress has come from the utilization of scientific discoveries by the engineer. From this we can expect great changes in the future which will influence civilization in ways undreamed of at present.

The professional development of the engineer parallels the momentous changes in civilization or shall we say that the momentous changes in civilization parallels the professional development of the engineer?

As engineering became a factor in the progress of civilization and affected the everyday life and existence of mankind, it approached the practice of a profession as set out in a Supreme Court definition of a profession which

is often quoted and which will stand repetition:

"A vocation involving relations to the affairs of others of such a nature as to require for its proper conduct an equipment of learning or skill, or both, and to warrant the community in making restrictions in respect to its exercise."

Here the interest of the public enters as a factor in the practice of engineering and points to the necessity of setting up certain qualifications to insure competence. One of these qualifications is suitable education. Engineering as a profession had its beginning when it received recognition in the colleges and universities of our country. It was then that the engineer emerged from the status of "mechanic" through "eminent mechanic" to "engineer," and registration or license to practice could be expected in the course of events.

So rapid has been the development of engineering that even now the association of "engineer" with "mechanic" still persists but the registration of professional engineers has done much to clarify the terms and enable engineers as well as society in general to distinguish the procedure of the professional engineer from that of the mechanic.

It was not until 1907 that the first engineering registration law was passed in Wyoming. At the end of ten years there were four states, at the end of twenty years there were twenty-three states, at the end of thirty years there were thirty-eight states and Puerto Rico and Hawaii, and in 1944 only two states Montana and New Hampshire, and the District of Columbia do not have registration laws. A registration law was passed in Alaska in 1938. Engineering registration is almost universal as a requirement for practice in this profession.

Registration has many relations to the professional development of the engineer. Its influence is exerted before registration and after registration. Before registration there is the influence on meeting the requirements of education and preparatory experience.

An important correlation is the accrediting of engineering courses by the Engineering Council for Professional Development which originated in a conference on Certification into the Engineering Profession held on February 3, 1932. The National Council of State Boards of Engineering Examiners is one of the sponsoring organizations of the E.C.P.D.

Another relation of registration to professional development which is receiving thoughtful consideration is the classification of "Engineer in Training." Two states, New York and Ohio, have already introduced this classification. The National Council of State Boards has approved this as a desirable relation of the young man to engineering registration and as a means of expressing the intention of becoming professional as soon as the necessary experience has been completed. This appears to be a step in the right direction for the professional development of the engineer. This relation to legal registration may be the way for the maintenance of a professional status and make it possible to remain aloof from labor organizations.

Registration is not the culmination of effort but is simply the beginning of professional practice. It is a time for the engineer to take an inventory of his qualifications and to search out the meaning of the profession of engineering.

The requirement of registration as a condition for the practice of engineering, as a means to obtain employment, or for advancement has made the engineer conscious of the necessity for competence.

The purpose of registration as contained in the Model Law is briefly "to safeguard life, health, and property." Such a worthy purpose however was bound to have many other good effects. Thus it is that the relation of registration to the development of the professional engineer has been one of many influences.

A most valuable influence on professional development as related to registration is the growing sense of oneness or of professional unity. Registration has taken down the fences which separated engineers into the many and increasing fields of practice. It has furnished a common ground upon which all can meet as just one kind of engineers—registered professional engineers.

Call it a development of engineering consciousness or call it the spirit of a profession, by whatever name or thought, registration has rescued engineering from a mixture of trades, crafts, and professions. Registration has revealed the essentials of the profession of engineering and made possible that unity which can only exist in a true profession.

Principle, integrity, independence—these are the elements which characterize a profession.

The engineer has been one who gives and does. He gives himself to the tasks assigned to him and he does them. His interest has been in the successful completion of the work to be done. His work has been so much with the materials and forces of nature that he has given too little attention to his relation to society in general and to the protection of himself and of his profession.

Dr. Wickenden in his excellent re-survey of the Engineering Profession published as "The Second Mile" includes the following paragraph which is packed with thoughts:

"The Engineer, in a society based largely on group relations, needs his profession to safeguard his occupational and economic welfare. He needs protection against unethical competition, against indiscriminate use of the title "engineer," and against all influences which might undermine public confidence in his integrity and competence. He needs protection against those who assume that he is 'just another employee' and against sub-professional groups seeking to act for engineers in the process of collective bargaining. He needs protection against the levelling influences of unionism and of civil service. He needs the benefits of prestige built up through group publicity. He needs a collective instrument for shaping public policy in the realm of his responsibility. It is true that a professional organization is primarily a moral agency and not in itself an economic or political pressure group, but in the long run moral agencies are the more powerful and enduring."

What is the answer to all these needs for the professional development of the engineer and for the development of a

public recognition of the profession of engineering? Protection against unethical competition and against indiscriminate use of the title "engineer" is provided in the legal registration of qualified engineers by the State Boards with provision for reciprocal registration.

A natural outgrowth of the passage of registration laws was the inception of the National Council of State Boards of Engineering Examiners in 1920. The National Council composed of the State Boards provides an advisory and coordinating agency to assist in a more efficient and uniform administration of state registration laws. It provides a national clearing house and information bureau for matters pertaining to the legal registration of professional engineers. It serves State Boards, State Committees, Engineering Societies, individual engineers and the public. This Council now has a membership of forty-eight legally constituted Boards of Registration with a total of over 75,000 registrants. Through the influence of such a Council and these thousands of registered engineers the public is learning to understand the value of integrity and competence in engineering work. When such knowledge becomes more universal the incompetent will no more attempt to use the title of engineer than a "quack" to assume that of a doctor of medicine.

Registration has made possible the professional development of the engineer as a recognized member of a legalized profession. But after he is registered the engineer has found many difficulties which will have to be overcome just as other professional men have had to overcome difficulties affecting their profession.

As Dr. Wickenden has stated in the quoted paragraph, the engineer needs protection against those who assume that he is just another employee and against sub-professional groups seeking to act for engineers in the process of collective bargaining.

What is the answer? With registration it has become possible to identify the engineer. This has made possible the development of group consciousness—of recognizing the unity of a profession and of those who compose the profession. From such a consciousness has developed this National Society of Professional Engineers which provides for the protection of all professional engineers and for their professional development. It is a society with certified members, every one certified by a legally constituted State Board. Thus we find the important relation of registration to the professional development of the engineer.

This relation provides the basis for the uniting of all engineers regardless of branch or specialized practice into one single body of professional engineers with a single purpose—professional development. In this relation of registration to the professional development of the engineer, is found the means, through the National Society of Professional Engineers to provide for the needs as stated in the quotation:

The need for prestige through group publicity.

The need for a collective instrument for shaping public policy in the realm of responsibility.

The need for a moral agency in support of the professional elements of engineering.

Registration has developed a broader view of engineering—a national in place of a local view—a sense of the inclusiveness of all engineers in place of an individualistic attitude—in short the development of a cooperative viewpoint. The extent to which engineering has become inclusive of so much that is scientific, theoretical, and systematic in study and in application to design, construction, and operation has caused the dawn of a new era which requires the services of many highly specialized engineering consultants. This is inherent in any profession. The general practitioner cannot be expected to know and to do everything that is included in his profession. Registration has brought this forcibly to the attention of the engineer and the public is beginning to have a clearer conception of the professionalism of engineering. Through registration there has developed the identification of the engineer of the practice in which he excels. This in turn has spurred him to greater development of his particular talents. Registration has thus developed a consciousness of the interrelation of the various branches of engineering, of the consulting specialists in each branch, and of the distinction between a skilled technician and a professional engineering specialist.

This development has led to an increasing use of the specialist, for engineering matters which are beyond the particular field of the general practitioner. Of the greatest value is the development of the professional engineer in coordinating the work of these many specialists and of being able to locate or to know them through the facilities of legal registration.

Registration has quickened the development of a professional consciousness in the engineer. Nowhere is this more apparent than in the engineer who has obtained his certificate of registration by successfully passing a written examination. Study and review in preparation lead to self-examination of qualifications and of the meaning of professional engineering. This professional development of the engineer leads further to a realization of the necessity for a continuation of studies and research and association with other engineers for discussion and mutual stimulation.

From the simple past to the complex present how is registration related to the professional development of the engineer?

Registration has developed in the engineer, a quickening interest and an understanding of his responsibility to society.

Registration has developed in the engineer, thoughts which point along the path to leadership in the councils of society, to participation in civic affairs, in the executive and legislative branches of government, and in all the spheres of influence in life and in living.

Registration has provided a screening medium to eliminate the unqualified.

Registration has spot-lighted the necessity for adequate education, adequate preparatory experience, adequate standards, and adequate ethics.

Registration has started to focus the light of public attention on the profession of engineering.

(*Continued on Page* 26)

PRESIDENT REPORTS

REVIEW OF THE SOCIETY'S ACTIVITIES

AND DISCUSSION OF SOME OF ITS PROBLEMS

DURING THE YEAR 1944

TOGETHER WITH PROSPECTS FOR 1945

BY PRESIDENT HARRY E. NOLD

National Headquarters

During the past four years your president has been in Washington, D. C., on many occasions. Whenever possible he has spent some of that time at headquarters office of the National Society. He knew before he was elected to the presidency that it was impossible to do efficient and effective work in the crowded quarters then available. Figuratively, and almost literally, personnel were tramping on each others toes in attempting to carry on their work. The Executive Secretary, Mr. Larson, had no place where he could hold conferences without every word being overheard by one or more of the office staff. From the standpoint of effective operation, conditions were intolerable. At the suggestion of the president, provision was made in the 1944 budget for expansion of office space. The opportunity for expansion came during this last summer when space across the hall from the offices became available. The president accordingly authorized the renting of this additional space and suggested to our secretary that he occupy it as his private office. Now for the first time during the past four years, we have space so that the staff can work with a reasonable degree of efficiency. The secretary, after a conference with the president, re-organized the office work by placing more responsibility on Mrs. Coad, so that now she is responsible for the details of office operation. This has relieved the secretary of such detail and as far as the president has been able to observe, has increased efficiency of operation materially.

Growth Of The Society

Our Society has shown what is believed a satisfactory rate of growth during the year. Our membership in December, 1943 was 7150 and is now 8800. Analysis of the sources of increased membership is less pleasing than the mere rate of growth would seem to indicate. There are three natural sources of growth:—First, increased membership in established State Societies; Second, memberships at large from unorganized states; Third, new State Societies.

Since the summer of 1943, the following new state societies have been chartered and inducted:—Minnesota, Georgia, Wisconsin and Kansas. Each of these organizations was well organized under able leadership at the time it was inducted. They are all in thriving condition and we may expect that they will continue so. It should be said that the chartering of four new soceties since the middle of 1943 can be attributed to the untiring effective work of the secretary. In some cases it has taken several years of work before sufficient active interest developed in the state to result in society organization. Our secretary is peculiarly effective in promotional and organization work. For this he deserves much credit. As your president has traveled from state to state and met with one society after another, he has heard many words of praise for the effectiveness of, and the diplomatic manner in which the secretary carries on his field work.

The disappointing part of the picture is that all too few of our operating state organizations have materially increased their membership. The causes for this are not obvious. Perhaps your National Officers have spent so much time in developing new territory that they have neglected to cultivate the old. In some cases, state leadership seems to be lacking. Whatever the cause, it is not due to the lack of eligible membership material.

American Engineer

Arthur Sheridan has for years edited the American Engineer without compensation. This he has done in spite of the fact that he is an exceedingly busy man, and has had to do most of his editorial work at night, when people feel that they must relax. The Society is deeply indebted to Editor Sheridan for what he has done to make the American Engineer a successful magazine.

That the editor is frequently in serious difficulty is clearly shown by his editorial in the September number of this year in which he makes an appeal to the officers and members of the National Society and State Societies for worthwhile articles for publication. He states as follows, "assistance must be forthcoming without delay, if the American Engineer is to be continued as a messenger of the professional engineers movement".

The editor is, of course, correct in expecting that officers and members would write articles for publication. The president entered upon his term of office with every intention of writing a number of articles and editorials for the American Engineer. Undoubtedly a number of members of this board had similar intentions. The facts are that all of us are busy men and tasks like writing for the American Engineer are put off from day to day until we finally wake up and find the deadline for the month has passed and nothing has been written. I do not blame Editor Sheridan for being dissatisfied, but it is the deep conviction of your president that the real trouble is the defect in the system, the changing of which is beyond the power and time of a volunteer editor. It is my opinion that the only way in which members can be persuaded to contribute worth while articles is to have such articles solicited from the individuals

several months in advance. This means that the editor's office would have to plan a schedule of the topics to be covered in advance of publication, and competent individuals would have to be selected and solicited to prepare the articles. The present editor is not to be criticized for not adopting such a plan. Carrying out of a program of this nature requires much more work and it would be entirely unreasonable to expect that it could be done under the present system.

Your president has come to the conclusion that one of the most important problems facing the Society right now is to establish the editor's office at the Society headquarters in Washington, and provide for a paid editor with clerical help. Such an editor should not only carry the work done by the present editor, but in addition, should develop a planned program of specialty articles for six or more months ahead and he should assume the responsibility of seeing that properly qualified men are solicited and who will write the articles. He would need to have time to search out and publish many items of interest to our profession which are available in one way or another in the headquarters office. His nearness to the National Legislative Body would enable him to publish pertinent legislative information from time to time.

Providing a paid editorial staff for the American Engineer is in your president's opinion, a problem which needs to be solved very soon. It should be made plain that this is not criticism but merely recognition of the fact that the editing of our magazine now requires so much work that we must be ashamed of expecting that the present system can much longer continue.

N.C.S.B.E.E.

The registration and licensing of professional engineers is the function of a board, legally provided for and operating in each state. These boards, in accordance with the laws under which they operate, determine the qualifications and conduct the examinations qualifying for registration as a Professional Engineer. Because the state laws differ, and because state boards differ in their experiences and opinions, we do not have uniform qualifications for registration in the various states. In spite of variations in state laws, the name Professional Engineer has come to be recognized as a term signifying professional status. For this we must thank the hard working and conscientious personnel of the various state boards and their organization, the National Council of State Boards of Engineering Examiners.

At Indianapolis in 1943, and at Lexington, Kentucky in 1944, your president attended the annual meeting of N.C.S.B.E.E. He found an organization which has a membership including almost 100% of those eligible for membership and in which more than 80% of the constituent boards had representatives present at the 1944 annual meeting. This organization, like our own, is interested in developing the engineering profession to assume its rightful place among the learned professions. The National Council knows the strength and weaknesses of our registration laws. N.C.S.B.E.E. is interested in developing uniform registration laws. So are we. N.C.S.B.E.E. is interested in having the registration laws enforced. So are we. N.C.S.B.E.E. and N.S.P.E. have many common problems and many problems not common. In spite of this there has been very little formal collaboration between these societies. Through the able cooperation of C. S. Svenson, President, and Keith Legaré, Secretary of N.C.S.B.E.E. and because of the enabling action of this board, we have now established a joint committee of the two organizations, to study and make recommendations for the solution of mutual problems. Your president considers this one of our major accomplishments of 1944.

N.C.S.B.E.E. is not, numerically, a growing body. Practically all who are eligible for membership are now members. Due to limited size it cannot be supported by individual dues. Due to limits of state laws it cannot be adequately supported by dues assessed against state boards. Consequently, this organization must receive financial aid from other organizations. Several of our member organizations have contributed to the support of N.C.S.B.E.E. N.S.P.E. has been contributing $200.00 per year. From the standpoint of value received, our contribution should be $1000.00 per year. This is, of course, not now possible, but we should increase our contribution as rapidly as possible.

Constitution

Our new constitution has been approved by about seventy-five (75) per cent of the members who voted. For this your president is grateful. It shows that our membership has confidence in recommendations made by this Board. I consider the preparation and adoption of the new constitution one of the major accomplishments of 1944.

In an editorial in the November 1944 issue of the American Engineer, in discussing the need for the new constitution, your President said, "Preliminary Board discussions have indicated that N.S.P.E. dues will probably be raised from $4.00 to $6.00 as soon as practicable after the new constitution is approved." Your President is not clear as to the details of the next steps to be taken by the Board to put into effect the previously expressed intention to increase dues to $6.00 under the new constitution. It seems that the following actions are now necessary: (1) Declare the new constitution approved; (2) Determine the date on which the new constitution is to be made effective; (3) Take action regarding the increase of dues and when the new dues shall go into effect; (4) Notify State Societies, giving them enough time to get their constitutions and by-laws changed, where such change is necessary, so that they can collect the new national dues. Your President does not see how new dues can be put into effect before January 1, 1946.

General Conclusions

With entire recognition of the weaknesses existing in our organization and a realization that it has many problems to solve, your president still feels that N.S.P.E. is an actively developing organization. Mistakes have been made, some member organizations are not as active as they should be, due to a lack of finances, combined with lack of vision of officers. We are not rendering the service to our members which should be rendered. Nevertheless, your president feels that the past year has been a year of progress.

(*Continued on Page* 26)

A VALUABLE SCHEDULE

MINIMUM FEES AND SALARIES

TEXAS SOCIETY PUBLISHES RECOMMENDATIONS THAT MERIT WIDESPREAD REVIEW

REPRINTED FOR FORM—NOT FIGURES

The clarity and conciseness of the Texas Schedule justifies publishing the same as a criterion, as well as a plea for action, by other State Societies.

TEXAS SOCIETY OF PROFESSIONAL ENGINEERS
Schedule of Salaries for Professional Engineers in Texas

Acknowledgment

In preparing the Schedule of Salaries for Professional Engineers in Texas, the committee had access to and made use of the 1941 Schedule of Minimum Engineering Fees and Salaries prepared by the Ohio Society of Professional Engineers, the Schedule of Salaries and Fees for Professional Engineers in Texas adopted by the Texas Society of Professional Engineers in 1942, the report of the committee on Wages, Hours, Unions, etc., Texas Section, American Society of Civil Engineers, dated August 30, 1943, and the report of the Committee on Salaries, American Society of Civil Engineers, October 10, 1943. The salary brackets for the respective grades were adjusted to more nearly fit requirements in Texas.

Foreword

Professional engineering pioneers all major developments of society. During abnormal periods of national or community development, engineering services may be at a premium for short periods of time. The engineer employed under these conditions must realize that such expanded remuneration cannot be expected under normal and more permanent conditions.

The herein schedule of salaries for professional engineers and their engineering assistants is predicated upon permanent employment which is here defined as continuous employment for twelve (12) months or longer. It is intended also that a salary normal to a given location will be supplemented by allowances that will compensate for travel and similar expense occasioned by service at other than the home location.

When it is necessary to move the official headquarters or home of a professional engineer for the benefit of his employer, the expense necessary for moving the professional engineer's household goods and personal effects, not exceeding 7000 pounds, should be paid by the employer, in addition to the individual's travel and subsistence expense. Travel and shipping route should be the most direct taken by recognized common carriers.

In the application of these schedules the salaries should be based upon the type of work performed and the responsibilities assumed. The classification of any individual does not imply that the individual is unqualified to assume the responsibilities and duties of any higher grade; neither should mere length of service be regarded as the sole basis for the determination of grade and salary.

Minimum Schedule of Salaries

The salaries as prescribed are established as proper for Texas, the range in salary being sufficient to embrace differences in cost of living as well as differences in magnitude or importance of the work.

Salaries shall be at or within the rates for the several grades of employment, as follows:

Sub-Professional		*Professional*	
Grade 1	$1,200 to $1,500	Grade 6	$3,800 to $4,800
Grade 2	1,500 to 1,800	Grade 7	4,800 to 6,000
Grade 3	1,800 to 2,400	Grade 8	6,000 and up
Grade 4	2,400 to 3,000	Grade 9	10,000 and up
Grade 5	3,000 to 3,800		

The grades of employment for professional engineers and their engineering assistants shall be as follows:

Sub-Professional
$1,200 to $1,500

Grade 1

Duties: Under immediate supervision to assist on engineering work in field, shop, office, or laboratory; to make simple observations, measurements and computations; to perform the usual work of chainman, engineering apprentice, or laboratory assistant, etc.

Requirements: Education equivalent to graduation from a high school. Reliability, aptitude, ability to work with others, compliance with oral and written instructions, neatness and good citizenship.

Sub-Professional
$1,500 to $1,800

Grade 2

Duties: Under immediate supervision to assist on engineering work in field, shop, office, or laboratory; to make simple observations, measurements, sketches and computations; to make tracings and simple drawings; to letter and to assist in compilation of technical data, etc.

Requirements: Education equivalent to graduation from a high school and *two years progressive experience on engineering work. Reliability, aptitude, ability to work with others, compliance with oral and written instructions, neatness and good citizenship.

Sub-Professional
$1,800 to $2,400

Grade 3

Duties: Under immediate supervision to asisst on engineering work in the field, shop, office or laboratory; to make simple observations, measurements, sketches, and

computations; to make tracings and simple drawings; to letter and to assist in the compilation of technical data; to perform the usual work of rodman, junior draftsman, technical assistant or such other work as the incumbent of the position is technically qualified to perform by reason of his training, etc.

Requirements: Education equivalent to graduation from high school and *four years progressive experience on engineering work, or college graduate — no practical engineering experience. Reliability, aptitude, ability to work with others, compliance with oral and written instructions, neatness, good judgment and good citizenship.

Sub-Professional

$2,400 to $3,000

Grade 4

Duties: Under supervision to perform elementary or routine work in field, shop, office or laboratory requiring a knowledge of engineering practice and methods, but with little opportunity for independent action or decision; to make minor surveys or working drawings and designs and estimates; to lay out minor work or set up simple apparatus; to inspect minor construction or fabrication; to make routine tests of equipment, materials, or processes; to perform the usual work of survey instrument-man, advanced apprentice, instructor and the lower grades of draftsman and inspector, etc.

Requirements: Graduation with a degree in engineering from an engineering school approved by the Texas State Board of Registration for Professional Engineers, plus one year of progressive experience on engineering work; or *six years of progressive experience on engineering work indicated for Grades 1 to 3 with at least two years experience as indicated for Grade 3. Reliability, aptitude, compliance with oral and written instructions, ability to work with others, neatness, good judgment and good citizenship.

** Scholastic credit given for each successful year of engineering study is computed as one year's experience.*

Sub-Professional

$3,000 to $3,800

Grade 5

Duties: Under supervision, to perform moderately difficult engineering work or to supervise and be responsible for a small squad on routine engineering work; to make and check working drawings, simple designs, details and estimates; to prepare technical reports of a minor nature; to keep technical records and work up record data; to perform the usual work of the higher grades of draftsman, inspector, survey instrument-man, detailer, laboratory assistant and squad boss, etc.

Requirements: Graduation with a degree in engineering from an engineering school approved by the Texas State Board of Registration for Professional Engineers, plus two years of progressive engineering experience of which at least one year shall be equivalent to Grade 4; or *eight years of progressive experience on engineering work indicated for the lower grades, with at least one year's experience as indicated for Grade 4; ability to exercise engineering and technical judgment and skill, aptitude, initiative, resourcefulness, ability to grow; neatness, effectiveness in planning so as to utilize time of his group to best advantage, good judgment and good citizenship.

Professional

$3,800 to $4,800

Grade 6

Duties: To perform important engineering work in field, shop, office or laboratory requiring the exercise of independent action and decision, or to supervise the work of a small group on engineering work of moderate importance; to conduct engineering research of moderate importance; to check designs, and lay out and inspect construction or fabrication; to plan and conduct tests of equipment, material and processes; to purchase and inspect materials; to write specifications; to make reports on phases of a project; to perform the usual work of designing engineer, testing engineer, research assistant, chief inspector.

Requirements: Graduation with a degree in engineering from an engineering school approved by the Texas State Board of Registration for Professional Engineers, plus four years of progressive experience on engineering work of which at least one year shall be equivalent to that indicated for Grade 5; or *ten years of progressive experience on engineering work as indicated for the lower grades, of which at least two years shall be equivalent to that indicated in Grade 5, capable of assuming responsible charge of engineering work; and have a license as a Professional Engineer in Texas, or permission from the State Board of Registration for Professional Engineers to practice engineering in Texas; initiative, aptitude, resourcefulness, ability to grow, effectiveness in planning so as to utilize time of his group to best advantage; good judgment and good citizenship.

Professional

$4,800 to $6,000

Grade 7

Duties: To perform particularly important engineering work in field, shop, office or laboratory, requiring engineering qualifications or attainments, and offering wide latitude for independent action and decision; or to be in responsible charge of a minor engineering organization; or to have administrative and technical charge of a minor division of a large organization; to plan, direct and supervise the design or construction of engineering or manufacturing projects; to supervise the preparation of specifications and contracts; to undertake comprehensive research; to supervise testing work of importance; to render reports on complete projects; to be responsible for technical operations of his division; to perform the usual work of resident, designing, development, research or maintenance engineer.

** Scholastic credit given for each successful year of engineering study is computed as one year's experience.*

Requirements: Graduation with a degree in engineering from an engineering school approved by the Texas State Board of Registration for Professional Engineers, plus about eight years of progressive experience on engineering work of which at least two years shall have been in charge of engineering work of a character indicated for Grade 6; or *fourteen years of progressive experience on

engineering work as indicated for the lower grades, of which at least two years shall be the equivalent of that indicated for grade 6; aptitude, initiative, resourcefulness, ability to grow, good judgment and good citizenship; ability to prepare and deliver a technical address before a large audience and have a license as a professional engineer in Texas or permission from the State Board of Registration for Professional Engineers to practice engineering in Texas.

Professional
$6,000 and up

Grade 8

Duties: To be in responsible professional and executive charge of a major division of a large or otherwise important engineering or manufacturing or production or processing project, involving planning, designing or supervision of construction, operation or maintenance; to give independent critical or expert engineering advice for executive action; to assume professional and executive responsibility for the whole of a smaller engineering or manufacturing project; to perform the usual work of a division engineer, production engineer, principal assistant engineer or (for a small organization) chief engineer or works manager.

Requirements: Education equivalent to graduation from an engineering school approved by the Texas State Board of Registration for Profesisonal Engineers plus about eleven years of broad professional experience embracing a thorough knowledge of engineering and experience in business administration, or high school graduate plus sixteen years of progressive practical engineering experience, ability to coordinate the activities of the various divisions of an organization, good judgment and good citizenship; ability to prepare and deliver a technical address before a large audience, and have a license as a professional engineer in Texas or permission from the State Board of Registration for Professional Engineers to practice engineering in Texas.

Professional
$10,000 and up

Duties: To have entire charge of and responsibility for an entire engineering organization comprising more than one division and either of large scope or engaged in more than one class of work; to determine and establish technical and administrative policies and procedures; to be finally responsible for all engineering or technical operations; to perform the usual work of a chief engineer, or manager of a major engineering or manufacturing organization or director of a comprehensive research organization.

Requirements: Education equivalent to graduation from an engineering school approved by the Texas State Board of Registration for Professional Engineers, supplemented by cultural, economic and social studies, plus about 15 years of broad professional and business experience, or high school graduate plus twenty years of progressive practical enginering experience, and have a license as a Professional Engineer in Texas or permission from the State Board of Registration for Professional Engineers to practice engineering in Texas.

TEXAS SOCIETY OF PROFESSIONAL ENGINEERS
Minimum Fees for Professional Engineers

Acknowledgement

In preparing the Schedule of Fees for Professional Engineers in Texas, the committee used the report adopted by TSPE in 1942 and data from several other sources. The 1941 Schedule of Fees adopted by the Ohio Society of Professional Engineers, resulting from a six-year study by that Society, are believed applicable to Texas. That Society's fee schedule, therefore, was adopted by a unanimous vote of the committee and is given below.

Minimum Fees For General Engineering Services

Foreword

To satisfy the requests for and realizing the necessity of having established and recognized standards of engineering practice, the Texas Society of Professional Engineers had adopted a minimum fee schedule for professional engineering.

The fee schedule represents the minimum charge that are compatible with engineering service of the proper quality and scope.

Division A

1. The following schedule of basis minimum fees shall apply to general engineering services throughout the State:

Cost of Construction	*Basic Minimum Fees (%)*
Less than — $ 10,000	10.0 plus or per diem
$ 10,000 — 25,000	8.5
25,000 — 50,000	7.5
50,000 — 100,000	7.0
100,000 — 250,000	6.5
250,000 — 500,000	6.0
500,000 — 750,000	5.5
750,000 — 1,000,000	5.25
1,000,000 — 10,000,000	5.0
Over — 10,000,000	4.5

2. The distribution or "breakdown" of the above schedule as applying to the various percentages for the different cost classifications shall be as follows: (All in percentages of the total fees).

Preliminary Estimates and Preliminary Reports	5% to 10%
Detailed Plans and Specifications	55% to 60%
General Supervision	to 35%
Basic Minimum Fee	to 100%

3. Scheduled fees shall cover engineering services including preliminary estimates and preliminary reports; complete detailed plans and specifications, and detailed estimates of costs; general supervision of construction, including lines and grade surveys; preparation of monthly and final estimates for contractors' payments. The schedule of fees does not include property, boundary or right-of-way surveys; inspection of construction; shop, mill, field or laboratory inspection of materials; cost of test borings and other sub-surface explorations; or calculations of special assessments. These latter services shall be furnished by the Client or, at the Client's choice, may be provided by the Engineer at actual cost.

The Engineer shall furnish all necessary resident supervision, but the Client shall pay, in addition to the

basic minimum fees, the actual payroll cost of such resident supervision as may be required, in the opinion of the Engineer.

"General Supervision" is defined as supervision of the construction by periodical visits by the Engineer or his representative from the office of the Engineer.

"Resident Engineer" is defined as the representative of the Engineer who has responsible charge of the construction work and spends a substantial part of his time on the work.

"Inspector" is defined as a person who inspects the construction in detail under the supervision of the Engineer or a representative of the Engineer.

4. Basic Minimum Engineering Fees shall be used for bridges, buildings, power plants and electrical transmission, distribution and street lighting systems, sewerage and sewage treatment improvements, water works and water treatment improvements.

Paving, sidewalks, heavy grading and extensions of water lines for local service shall be subject to a reduction of one per cent from the above Basic Engineering Fees. These reduced basic engineering fees shall include resident supervision, but do not include inspection for the various classes of work specified in this paragraph.

5. The above schedule is understood to be minimum fees for normal conditions and may be increased for difficult or unusual conditions.

6. Should the Engineer be required to render additional service because of changes, delays or other causes beyond his control, then the Engineer shall be compensated for such additional services on the basis of a per diem or monthly rate to be agreed upon between the Engineer and the Client.

7. Basic Schedule Fees may be reduced twenty-five per cent (25%) for services to Architects or other Engineers by mutual consent and agreemnt or where reciprocal privileges are accorded.

8. The Basic Fee includes the furnishing of three (3) copies of reports, plans and specifications (on paper). Additional copies shall be furnished to the Client at cost. Original documents, survey notes and tracings are and shall remain the property of the Engineer.

9. The minimum fee for "Preliminary Estimates and Preliminary Reports," as set forth in preceding breakdown of the basic fee, is not intended to cover engineering services in connection with preliminary investigations and reports involving detailed consideration of operations, maintenance and overhead expenses, or the preparation of rate schedules for the sale of utility service, and consideration of the economic feasibility of such projects as municipally or privately owned electric or other public utilities of a competitive nature. Fees for engineering services in connection with preliminary investigations and reports of this nature shall not be less than fifteen per cent (15%) of a basic minimum engineering fee (expressed as a percentage in paragraph two as applied to the Engineer's preliminary estimate of the project). Should the Engineer be engaged subsequently to furnish detailed plans and specifications and the general supervision of construction, a part of the per diem or lump sum fee for the preliminary investigation and report equivalent to five or ten (5-10) per cent of the basic engineering fee shall apply as a credit on the basic fee.

10. Minimum Per Diem Fees

(a) Fees shall be based on a per diem rate where the nature of the service to be rendered by the Engineer is such that a percentage fee is not adaptable or convenient, such as consultation and preliminary investigations. The fee for the principal shall be at the rate of $40.00 per day, with rates above this minimum commensurate with the nature of the service and the experience and the professional standing of the Engineer.

(b) Fees for services in connection with legal proceedings shall be at the minimum rate of $50.00 per day for the principal except that the minimum fee for appearance in court shall be $50.00 per day or fraction thereof.

(c) All services of assistants, draftsmen, etc., shall be paid for at actual cost plus one hundred per cent (100%) for overhead, "readiness to serve" and profit, or at an equivalent minimum per diem rate, and in either case plus "outside expense" at net cost. The term "outside expense" shall include transportation and sustenance incurred by the Engineer or his assistants traveling in discharge of duties connected with the work, and shall include the net cost of incidental expenses such as telegrams, telephone toll charges, extra reproductions of prints or photos of drawings, specifications and other documents required for the proper execution of the services for the Client.

11. Lump Sum Fees

(a) Fixed lump sum fees shall not be less than those computed on a per diem or percentage rate.

12. Violation.

(a) Non-compliance with the terms of this schedule will be considered as unethical practice by the Texas Society of Professional Engineers.

Minimum Fees for Mechanical and Electrical Consulting Engineering Services For Building Construction

Division C

(Division C schedules are supplementary to those of Division A)

1. The following schedules of basic minimum fees shall apply to consulting engineering services in the mechanical and electrical fields in connection with building construction.

One of the two following basic schedules shall be used for determining fees:

Method No. 1 applying to work done direct for Owner.

Mechanical or Electrical	*Basic Minimum Fees (%)* *New Work*	*Alteration Work*
Less than $10,000	10.0	12.0
$ 10,000 to $25,000	8.5	10.0
25,000 to 50,000	7.5	8.5
50,000 to 100,000	7.0	7.5
100,000 and up	6.5	7.5

2. The distribution or "breakdown" of the above schedule for partial or incomplete services as applying to the various percentages for the different cost classifications shall be as follows: (All in percentage of the total fees.)

Preliminary studies and estimates	15%
Design-drawings and specifications including preliminary studies and estimates	75%
General Supervision	25%
Complete Service	100%

3. Method No. 2 applying to work done for Architects.

Distribution of Work	*Basic Minimum Fees (%)* *New Work*	*Alteration Work*
Preliminary studies and estimates	1.0	1.5
Design drawings and specifications, no preliminary work	2.5	3.0
Design drawings and specifications including preliminary work	3.0	4.0
General Supervision	1.0	1.5
Complete Service	4.0	5.0
Advisory Supervision	0.5	0.75

Note: The above Schedule No. 2 is intended to apply to work done direct for an Architect or other Engineer and is not applicable to work done direct for an Owner.

4. The above schedule shall be interpreted as meaning a basic rate computed on the total construction costs incurred by the Owner for the execution of the work, not including fees for professional services. The engineer's estimate of the cost shall be the basis for the fee if proposals by contractors for the work have not been received.

5. The above schedules are understood to be minimum fees for normal conditions and may be increased for difficult or unusual conditions.

6. *Explanation of Schedules.*

(a) Preliminary Studies and Estimates.
This section is intended to include conferences with the client regarding a proposed building program, necessary inspection of the site, examination of the preliminary construction drawings, preparation of preliminary or tentative sketches for the mechanical or electrical work, outline statement or report on the engineering phases of the proposed work and preliminary estimates of construction costs and operating costs.

(b) Design-Drawings and Specifications
This section is intended to include services similar to those outlined under (a) and the following: Necessary conferences with the Client as required to facilitate the work, the preparation of complete drawings and specifications for the work, the checking of contractor's shop drawings and advice to the Client regarding the selection of apparatus and material.

(c) General Supervision
This section shall include the necessary supervision or inspection of the work in the field by the Engineer or his representative from the office of the Engineer.

(d) Complete Service
This section shall include preliminary studies; surveys and reports with estimates of costs; complete working drawings and specifications ready for bids; drafting of forms of proposals and contracts; checking of shop drawings; preparation of monthly and final estimates for contractor's payments and general supervision of construction.

(e) Advisory or Partial Supervision
This shall include inspection of the work when called for by the Client but not to exceed an average of two inspection visits per month. Any additional visits made at the request of the Client shall be charged for at the minimum rate of Five Dollars ($5.00) per hour plus traveling and sustenance expenses. This section shall also include the final inspection of the work.

7. Extra Engineering Services.

If after the Engineer's drawings and specifications are complete and approved by the Client the Engineer is requested to change his drawings and/or specifications because of changes made by the Client, then the Engineer shall charge an extra fee for making the changes. The extra fee shall be based upon his actual payroll costs plus 100% for such cost.

If after the Engineer's drawings and specifications are complete the work is abandoned, the Engineer shall be paid the minimum basic fee scheduled for each stage of the completed work.

If the work is abandoned before the Engineer has completed his work, he shall be paid a proportion of the basic minimum fee scheduled for each stage of the work corresponding to the amount of work the Engineer has done.

8. The basic fee shall include furnishing to the Client not more than three (3) sets of completed drawings and specifications prepared by the Engineer for the work.

The Engineer shall be reimbursed, at cost to him, for furnishing additional copies of his drawings and specifications.

9. Minimum Per Diem Fees

Fees may be based on a per diem rate where the nature of the service to be rendered by the Engineer is such that a percentage is not adaptable or convenient.

The minimum basic fee for the principal shall be a charge of forty dollars ($40.00) per day or five dollars ($5.00) per hour, plus traveling and sustenance expenses.

(*Continued on Page 26*)

Submitted as:

ITEMS OF GENERAL INTEREST

N. S. P. E. Directors Meeting

Pittsburgh—Feb. 9-10, 1945

The first meeting of the Officers and Directors of the National Society for the year 1945 will be held at the University Club in Pittsburgh, Pennsylvania on Friday and Saturday, February 9th and 10th, respectively. Reservations are being held in the name of Past President Holbrook, who can be reached at the University Club. Directors should address him directly for hotel accommodations.

Secretary's Report

As Of December 31, 1944

Following are excerpts from the report of Secretary Larson for the year 1944:

Report Of Active Membership

Society	As of Dec. 31, 1944 Total	As of Dec. 31, 1943 Total
Arkansas	60	68
Connecticut	111	101
Delaware	0	12
D. C.	133	140
Georgia	229	61
Illinois	130	131
Indiana	385	413
Kansas	43	0
Kentucky	19	13
Maryland	30	35
Massachusetts	10	10
Minnesota	421	334
Missouri	74	40
New Jersey	695	492
New York	1855	1777
Ohio	2181	1865
Oklahoma	169	146
Pennsylvania	808	769
Puerto Rico	34	21
Rhode Island	48	49
Texas	707	496
Virginia	47	36
Washington	39	42
West Virginia	38	25
Wisconsin	429	0
MAL	112	74
906	8807	7150

New State Societies

Petitions from the Georgia and Wisconsin Societies of Professional Engineers were received and acted upon favorably at the Board of Directors Meeting February 10, 1944.

The Georgia Society of Professional Engineers was formally inducted March 5th.

The Wisconsin Society of Professional Engineers was formally inducted May 26th.

A petition from the Kansas Society of Professional Engineers was received and acted upon favorably at the Board of Directors Meeting September 15th.

The Kansas Society of Professional Engineers was formally inducted October 5th.

A conference was held in Detroit, Michigan on October 18 with the members of N.S.P.E. residing in the vicinity of Detroit. Plans were made for a conference of all Professional Engineers in Michigan sometime during January 1945.

During the year the Georgia Society of Professional Engineers North Carolina, Nebraska, Iowa and Michigan.

Member State Societies

During the year the George Society of Professional Engineers reported formation of local chapters at Savannah and Atlanta. The Texas Society reported new local chapters at Corpus Christi, Waco and Fort Worth.

The New Jersey Society performed an outstanding piece of work in the reorganization and revitalization of its local chapters.

The Wisconsin Society of Professional Engineers reported the organization of a local chapter in the Fox River Valley.

During the year member State Societies were requested to contact all regional Federal offices having to do with the administration of the Fair Labor Standards Act, and to urge the incorporation of the term "Professional Engineer" in the regulations, parallel to the terms "Law" and "Medicine". We have reports so far that the following member State Societies have made those contacts: Washington, Minnesota, Wisconsin, Kansas, Texas, Missouri, Indiana, Ohio, New York, Pennsylvania, Georgia, New Jersey and West Virginia.

Comments

Mr. Arthur V. Sheridan, Editor
The American Engineer

The writer read with considerable interest, the article by Engineer A. H. Okun entitled "Engineer of the Future and the Future of Professional Engineers" in the November 1944 Issue of the American Engineer. Having become a member of the New York State Society, Monroe County Chapter, soon after its organization, this correspondent is somewhat familiar with the history of the Society, its objectives, and some of the hurdles it had to overcome.

While as stated in Mr. Okun's article, many inventions were the brain child of non-engineers, their development and improvement can be credited to engineers. For example, the first domestic water heating boiler of which we have record, dates back to A.D.-79, and was recovered from the ruins of Pompeii; the first boiler recorded as doing mechanical work, used with Hero's engine was made about 130 B.C., while the first real steam generator was Newcomen's Boiler built in 1705 — but look at the modern steam generators of today! Ancient works of Greece and Rome: Egypt and Asia, which stand to this day are structural and engineering marvels; the men who designed and had charge of their construction may not have been termed engineers, — but regardless of what they called themselves, they knew their job.

Furthermore — we owe most of our inventions to the fact that some people are lazy. Give a lazy man a job to do, and he will rack his brain to find a way to do it with the least physical exertion — then the engineer comes along and improves or perfects it. However, what concerns most of us, is not the past, but the future.

In spite of the fact that there are "57 varieties" of engineers, — the N.S.P.E. should stand by its guns for a unified profession. Let us take our example from the Medical and Legal Professions — as has often been pointed out in the American Engineer, and continually preached by Past President David B. Steinman — the medical profession has many specialists — maternity; ear, eye, nose and throat; tuberculosis; venereal diseases,

OFFICERS OF N. S. P. E. FOR THE YEAR 1945

The Vice Presidents represent Eastern, Midwestern, Southern and Pacific Zones, as per provisions of Society Constitution.

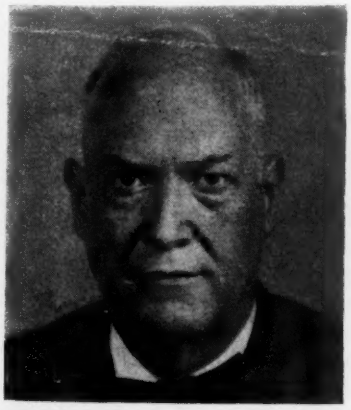
Thumbnail sketches indicate who the officers are and whence they come. Lack of space prevents greater detail.

ALLEN F. MITCHELL, *Vice President*
Born—Texas 1888. Educated Texas A. & M. College. Consulting Engineer. President—Texas Society P. E. Former Chair. —Texas State Board of Registration. Active—Civic and Veteran's Organizations.

LEO H. CLEARY, *Treasurer*
Born—Connecticut. Educated Catholic University. Consulting Engineer. Former President—District of Columbia Society P. E. Present Treasurer—N.S.P.E. Member—Numerous Technical Societies.

RITCHIE LAWRIE JR., *Vice President*
Born—Edinburgh, Scotland, 1890. Educated Carnegie Inst. Technology. Member—Firm of Lawrie & Green. District Manager—W.P.B. Past President—Penn. Society P. E. Active—Civic Affairs and Service Clubs.

HARRY E. NOLD, *President*
Born—Ohio 1883. Educated Ohio State University. Professor—Mining Engineering. Director—Engineering and Science Defense Training O. U. Past President —Ohio Society P. E. Author. Active in Educational and Prof. Circles.



BRUCE WILLIAMS, *Vice President*
Born—Chanute, Kansas. Educated—Mo. School Mines—Kansas Univ. Owner and Operator—Bruce Williams Laboratories. President—Missouri Society P. E. Has held high office in Civic and Service Organizations.

EDWARD LARSON, *Executive Secretary*
Born—Minneapolis, Minn. Educated—Univ. Cincinnati. Present Exec. Secretary —N.S.P.E. Former V. P. and Director—Ohio Society P. E. Former Consulting Engineer. Devoted to Prof. Society affairs.

WM. L. THRAILKILL, *Vice President*
Born—Bitter Root Valley, Montana. Educated—Univ. of Washington. Asst. General Manager—Washington Water Power Co. President—Washington Society P. E. Director—Washington Society P. E. Active in Fraternal Societies.

brain; and surgery; to mention a few — but they are all in one profession. Legally, they can treat any disease, whereas in practice, they usually stick to their own particular branch, and consult with others if the case requires. Lawyers are subdivided into criminal; corporation; real-estate; insurance; contract, etc. but they all belong to the Bar Association. So with the Professional Engineers — "united we stand, divided, we fall".

The writer for example is mechanical — electrical. It is a well known fact in "trade circles" that a mechanic is no better than the one he learns his own trade from, except as he develops himself. The same holds for the engineer. If, as a Junior, he works in a "tight organization" where every job has to be of a high standard, or "somebody gets H-1", habits of thoroughness and attention to detail naturally develop, or the budding engineer finds himself "on the sidewalk". If he works under a Chief who believes in the system — "the better I can train my assistant, the less I'll have to do myself", he is indeed fortunate. The writer was associated with such a man (a well known Architect and Consulting Engineer) for over 20 years, and as a result gained experience in power plant design, heating and ventilating, air-conditioning; plumbing and sanitation; fire-protection and electric wiring for light and power. A good specialist in any of the above branches could teach the writer things regarding his specialty — but the all around experience has fitted the writer for positions the specialist could not hold down. A good Engineer or Architect is one who knows his limitations and when occasion demands, does not hesitate to seek advice instead of trying to "bull a job through". (For instance, the writer would not attempt structural, steel or concrete design — he would get someone in that line to cooperate with him.)

Today, all around experience is hard to obtain. Large organizations, for productive as well as financial reasons, favor specialits. One group does heating, another ventilation, another plumbing, and so on. Also, in some industrial organizations, the writer has observed a "squad boss" or department head doesn't want anyone in his organization to know too much or have ideas, and one sure way to find yourself out of a job is to show initaitive. The quicker one separates himself from such an outfit, the better off he will be.

Fortunately, this writer never had to work under such conditions. At the outbreak of World War II, this former Navy man severed his business connections to go with the Navy Department Bureau of Yards and Docks in Washington. After "sitting tight" for a few days to become acclimated, it was found that the writer's Chief welcomed suggestions, and if they were good took them up with his superior, presenting them, not as his own ideas, but as a suggestion of "so and so" which is believed worthwhile. This particular gentleman is a top notch engineer, always ready and willing to share his knowledge and experience. From him, the writer learned many things, and at his suggestion was selected for a better and more responsible position with the Bureau.

Engineer Okun raises the question as to how much engineering skill is employed by an engineer designing a sewage plant. Who cares who designed the Imhoff tank or other equipment? It requires engineering skill to select the equipment best suited to that particular job, proper sizes, provide for future expansion, etc. And when it comes to power plants, some are top-notch, some are fair, and some are a "mess". A lot of skill and ideas can be used in the design and arrangement of a power plant.

About 12 years ago, the writer had charge of the design and installation of power and refrigeration for a large new brewery. His first move was to contact a friendly operating engineer who had been Chief Engineer in a well-known brewery back in pre-prohibition days. The conversation ran about like this: "Bill, I need some advice — I have to design all the mechanical work and refrigeration for the new... Brewery; if you were going to take the job as Chief Engineer there, how would you want it?" We sat down at "Bill's dining room table with a pad and pencil, and worked out all the refrigeration details of that plant in two hours that evening. As a result, the writer did a good job and is still welcome at that brewery. Bill knows the everyday problems of the men who have to keep such a plant operating 24 hours a day, 7 days a week and his suggestions were a great help. (Incidentally, the writer carried a card in the International Union of Operating Engineers for a number of years when operating in plants.)

For several years, there was a lot of agitation about who could be called an "Engineer" and the N.S.P.E. is to be congratulated on finally accepting the designation "Professional Engineer". Some years ago when the controversy was at its height, the writer took issue with Dr. Steinman and Past State President Roche and cited an example. The Chief Engineer of a large industrial plant in Rochester, N. Y. is a former Marine-Engineer of 25 years ocean-going experience. For 15 years of this time, he was Chief Engineer of various ships, among them the liner George Washington, which took President Wilson to France after the last World War. Now anyone who has ever served aboard ship knows that an Officer is always addressed as "Mister" and he rates "Sir" — "Yes Sir" and "No Sir" and a Chief Engineer's word is law in a ship's engine room. I defy any man to go to this plant in Rochester and tell that Chief that he cannot use the title of engineer because he is not a licensed professional engineer. And if you don't know him well enough to call him by his first name, you had better address him as "Mister . . . " or you are liable to leave that plant a lot faster than you entered it.

Engineer Okun mentions free plans for a swimming pool. Professional services given for nothing are usually worth just that. A certain plant wanted a diesel engine for auxiliary power, so an engine salesman sold a diesel engine—generator with an oil cooler. Later, it was found that an air-compressor would be required for starting: that a heat exchanger for jacket water cooling was also required, together with a surge tank, water circulating pump, automatic controls, a day fuel oil tank, oil transfer pump, and an oil filter for lubricating oil; further, additional space for this auxiliary equipment was required. At this stage, an engineer was engaged to take over, plan the layout and supervise the installation. The cement company will no doubt furnish plans for a swimming pool, and let the owner worry about such items as filters, water heaters, circulating pumps, chlorinators, hair-catchers, and what have you. They are interested in selling cement products.

The future of the Engineers is largely in our own hands. A unified organization with high professional standards, sufficient numerical strength to compel recognition; certain salary and fee standards below which no Professional Engineer will work for a firm or accept work from a client. During the height of the depression in Rochester, N. Y. when men were walking the streets, you could not hire a plumber or steam-fitter unless you paid the Union Scale — they were 100% organized. When you call at a Doctor's Office, it costs you at least $2.00 and not less than $3.00 for a home call. Any Doctor who cuts that price is promptly called before the local Medical Association.

With sufficient numerical strength, and increased influence, the N.S.P.E. can promote and secure legislation in the various states, and the Federal Government, whereby in order to take a Civil Service Examination for, or be appointed to a professional position as an Engineer in any of its branches, one must be a Licensed Professional Engineer. No Doctors, Dentists, Veterinarians, or Lawyers are appointed into any positions covered by their profession, unless they are qualified to practice and duly licensed in their state. Why not the same for the Engineer?

Some progress in this respect has been made — let us keep on — working and organizing — working with our law-making bodies — build ourselves into a power. Then we need have no fear of free-engineering — private firms and manufacturers of engineering equipment and supplies will fall in line. No manufacturer of drugs or chemicals ever goes out and antagonizes the American Medical Association.

Let us forget about the "57 varieties" and all be Engineers, at least as far as outsiders are concerned. Let us continue in our endeavors to draw every Licensed Professional Engineer into the N.S.P.E.

Frank L. Wadsworth

Fragments from

STATE & SOCIETY ACTIVITIES

ILLINOIS

Society Notes

Correspondent Max Suter forwards the following from Illinois:

The Legislative Committee of the Illinois Engineering Council has prepared a new bill for the registration of engineers to replace the law voided by the Illinois Supreme Court as unconstitutional. It has put the draft of this bill into the hands of its legal counsel to determine if this draft conforms to the conditions set up in the decision of the Illinois Supreme Court.

INDIANA

Concludes 1944 Season

The latest word from Indiana, taken from the December issue of The Indiana Professional Engineer, advises that the 1944 Annual Meeting was perhaps the best in the history of the organization. The Engineer promises details in future issues.

Referring to the address of President D. B. Prentice of Rose Polytechnic Institute, the Engineer says:

Why have we failed to gain recognition for the engineering profession? It is because we have had no one with the authority to speak for the profession. President Prentice believes that the Indiana Society of Professional Engineers with further development could be this authority.

Our problem, as President Prentice sees it, is "How can we make the public conscious of the engineering profession"? The solution to this problem is to attain professional solidarity. The attainment of this should start in the engineering schools. Engineering students should be enlightened to the fact that there are other sides to engineering learning besides the technical side. The Indiana Society of Professional Engineers could be of help with this by providing professional engineers as speakers before engineering students in the school — speakers who through their own experience can acquaint students with these other sides of engineering. Engineers as individuals can help in the solution of this problem in two ways. First, talk your profession and argue for it, and second, accept every opportunity for public service.

MINNESOTA

Transmits Bulletin

Quotes from the December News Letter include:

Greetings From England

We have a timely message from Col. P. C. Bettenburg, now in England. Commending the work of M.A.P.E. and Minnesota Construction Planning Committee, he writes: "You are right that this is the time to plan for our return to peace. And you can rest assured that it is the prime interest of every soldier right on the firing line, — his chance to get back to a normal life, if he lives through it. And he must have the incentive to want to live through it. A normal life to him is based on the foundation of a job that is essential, that he likes and is fitted for. He is sure that advance planning for his civilian interests can and must be done now without interfering with the war effort. So keep at it and enlist the help of all who are really interested in their soldiers at the front. We are now spending hours with a high-caliber staff working up plans for control of our enemy after the war. So an effort on the part of our country should not be amiss."

Civil Service Recognition

Perhaps as a result of the appearance at meetings of districts No. 4 and 5 of Robert D. Stover, acting director of the State Civil Service Commission, that body is turning to us for professional aid. We have already filled two requests. One was for panels to serve as oral examining boards for highway engineers in Mankato, Willmar, Duluth, Fergus Falls and the Twin Cities. The other was for proper ratings of training and experience records for guidance in promotions and assignments of highway engineers.

Our Membership Grows

This month we are happy to welcome the following new members: Paul R. Speer, Dist. Engineer, U.S. Dept. of Interior, St. Paul; George W. Bertilson, Mining Engineer, Oliver Iron Mining Co., Hibbing; O. T. Berge, Mining Engineer, Pickhands Mather & Co., Hibbing; P. E. Donohue, Asst. City Engineer, Virginia; Lester W. Newberry, Maintenance Foreman, Northwest Airlines, St. Paul; Bernard C. Craig, Project Engineer, Minn. Highway Dept., Grand Rapids.

On The Legislative Front

There isn't much time left between now and the convening of the Legislature, so if you still have some educational work to do with your legislators, it should be crowded into the next few days. Harold Chard and W. F. Rosenwald are considering a panel of sponsors. We may obtain additional legal help for phraseology so that our bill will be in the best possible form for presentation.

President Stolte Guest Speaker

President Stolte went to Jefferson City, Missouri, December 1, to address the annual meeting of the Missouri Society of Professional Engineers at the request of N.S.P.E. His subject was "Unifying the Engineering Profession" and it covered in detail the groundwork and other significant actions that have made M.A.P.E. the flourishing professional group it is today. If the engineers of that state had the typical "You've got to show me—I'm from Missouri" attitude, comments and questions following his talk proved that Mr. Stolte "showed 'em" how the professional engineers function in Minnesota. President Stolte was also guest speaker at the annual conference of the Minnesota Association of County Highway Engineers in Minneapolis, December 14. His topic was "The Status of the Professional Engineer."

Twin Cities

Districts 4 and 5 had a joint meeting and dinner on December 1 in Coffman Memorial Union at the University of Minnesota. The legislators of the two districts were invited guests. The purpose was to outline our legislative program and to explain and interpret the provisions of our proposed amendments to the state Registration Law. President Stolte described developments and made a careful and detailed analysis of the new provisions, giving at the same time the reasons back of the proposals. A general discussion followed, with questions and criticisms from the floor. There was an overflow attendance of 150 members and about 28 local legislators. The latter showed sincere and intelligent interest and all the members profited by the exchange of opinions and arguments. St. Paul had a second meeting December 15, when George Shepard spoke on "Inter-Professional Relationships." Some of the discussion centered around President Stolte's letter of suggestions for activities, and the organizational set-up of district societies. It was moved to request that the letter

be printed in the Bulletin. William Klett presided.

Eveleth

Three speakers headlined the meeting of District 8 in Eveleth, December 13, — Dr. Price, Grant Waits of Duluth and a representative of the Bell Telephone Company. Dr. Price reviewed the main objectives of M.A.P.E., pointing out the work yet to be done in promoting the profession as a whole. Grant Waits reviewed the work of the Employment Practices Committee, and the Bell Telephone men reported on wartime research of his company. Officers were elected and delegates chosen for the Annual Assembly. President Johnson presided. The new President will be Mr. M. E. Frank of Hibbing.

Marshall

Steaks that brought almost reverent approval, election of officers and lively discussion of standards of equipment for protecting engineers featured the December 12 meeting of District 7 at the Minnesota Cafe in Marshall. President Stolte outlined current registration activities. A welcome guest was Mayor Dave Gilchrist of Olivia. Application for membership was received from Arthur Bladholm, now in private business there. New officers are E. S. Ward, Willmar, President; Wendell Huber, Redwood Falls, Vice-President; Clayton Swanson, Willmar, Secretary. Delegates to the annual meeting are Henry Bray and J. S. Wagnild. Alternates are Howard Bussard, Alvin Engebretson and John O'Meara. Mr. Wagnild was named to the State Nominating Committee. The district will have its next meeting February 22 during the annual meeting in Minneapolis.

Fergus Falls

District 6 had its regular meeting December 2 at the River Inn Hotel in Fergus Falls, with Carl I. Erickson presiding. The legislative program was covered, and Dr. Price outlined current state-wide activities. The group passed a resolution providing that the State committee on salaries and wages present the Fee and Salary Schedule at the annual meeting of the County Commissioners and to mayors at the annual meeting of the League of Minnesota Municipalities. James Evans of Detroit Lakes was named councilor. Percy Stary, Detroit Lakes, was named to the State nominating committee. A. C. Glorvigan will head the local committee on membership. His members will be Walter Hoganson, P. F. Stary, L. J. Fjosne and Winston Larson.

Mankato

Election of officers was the chief item of business at District 2 meeting at the Saulpaugh Hotel, Mankato, December 7. Al Kircher officiated for President Minium, who also attended. This was President Minium's first meeting since July because of illness and it was a pleasure to have him back. A vote of thanks was given him for his splendid organization of the year's activities. New officers are C. N. Krosch, Fairmont, President; L. N. Grace, Faribault, Vice-President; Nels Johnson, Mankato, Secretary-Treasurer. Delegates to the annual meeting are Floyd Minium, C. N. Krosch, Ray Deegan, F. W. McKellip, and H. M. McLaird. Alternates are Al Kircher, C. N. Robertson, Percy Hosfield, Arvil Klessig, and Al Lehman. Ray Deegan was named to the State nominating committee.

Rochester

A number of guests attended the December 9 meeting of District 1 at the Carlton Hotel in Rochester. They were Dr. Price, Ray Deegan, Harold Olson, Al Kircher and E. J. McCubrey. New officers are K. M. McGhie, President; S. P. Kingston, Vice-President; C. A. Armstrong, Secretary-Treasurer; Arthur Stegner, member of the Executive committee, and A. C. Leonard, member of the State Nominating Committee. Delegates to the annual meeting are George E. Carlson, C. D. Conzett, E. W. Krueger and G. J. Sullivan. Alternates are E. P. Effertz, Oswald Lind, and T. R. Moore. Dr. Price spoke on the philosophy underlying M.A.P.E.'s activities and Mr. Olson outlined current projects. Mr. McCurbrey showed charts on comparative wage structures.

NEW JERSEY

Headquarters Office—Trenton

Office Secretary Selected

The new executive offices of the New Jersey Society to be located at 86 E. State Street, Trenton, on the corner of State and Broad Streets, will be opened shortly after January first. In making this announcement, the first of the three major steps in the program of organizing a headquarters staff and office has been completed.

An office secretary has also been chosen from a wide field. The successful candidate is Miss Ruth Wenzel of 455 West State Street, Trenton. Miss Wenzel will report for duty on December 15, 1944. Thus, the second step in the program is now a matter of fact.

The third and final step, that of securing an executive secretary for the Society is now underway. It is hoped that a final announcement for the entire program can be made in the January issue of the New Jersey Engineer.

Civil Service Reclassification

Reports are current that the recent reclassification program of the State Civil Service Commission will give greater recognition to licenses to practice professional engineering and land surveying as a minimum qualification than heretofor. While the tremendous task of reducing title groups has in the main been completed, descriptions of duties and work and minimum qualifications for each title have not been released. It would be a fine example if due regard is given to an existing state law insofar as positions in the state service relating to engineering and land surveying are concerned.

NEW YORK

Bronx County Chapter

President Knight advises that at its last 1944 meeting Engineer Charles F. Giraud, Chairman, Ethics and Practice Committee reported regarding the schedule of minimum fees for survey work, prepared and adopted by the "Association of City Surveyors of Greater New York, September 29, 1944" a copy of which was filed with our Secretary. Engineer Giraud moved the endorsement of the schedule by Bronx Company Chapter insofar as it affects the Bronx and urged that a copy be sent to practicing Licensed City Surveyors of Bronx County, both members and non-members of the Chapter. The motion was duly seconded and carried. Additional copies of the schedule may be obtained from Engineer Charles A. Ranhoffer, 4223 Grace Ave., Bronx, New York, Secretary of the Association.

Engineer Samuel J. Kessler, Chairman, Board of Examiners, reported that the list of nominees to serve as engineers for surveys on unsafe buildings for 1945, in accordance with Paragraph 2.2.4.4.1 of the Building Code, was completed and would be sent to the Municipal Civil Service Commission. Three names have been added.

The report of the Economic Status Committee on Fees and Salaries presented at the June 1, 1944 meeting was accepted by the Chapter. Copies of this report have already been forwarded to the State Society. The following members were elected as a Nominating Committee for the forthcoming annual election of Officers and Directors: Edward T. Crinnion, Joseph A. Brunner, Sylvester W. A. Murphy, Eugene L. Herzman, Edward B. Fitzpatrick.

Engineer John J. Foody, recently licensed by the State of New York, twice our guest, requested an application for membership at the close of the session.

Broome Area Chapter

Notes From Bulletin

Post Mortem

"The December Meeting was held at the I.B.M. Homestead on Wednesday evening, December 13, 1944. This was a joint meeting of the Ithica Section of the A.I.E.E. with the Broome Area Chapter. Dr. Allen B. DuMont, President of the Allen B. DuMont Laboratories, Inc. spoke on the subject of Television. He described the development of Television from its earliest conception up to the present time and illustrated his talk with both lantern slides and motion pictures. Despite the bad weather and extremely poor driving conditions 151 members and guests were present.

"The following men have been accepted for membership in the Broome Area Chapter of the Professional Engineers and we extend to them our hearty welcome — W. S. MacLaughlin, R. W. Blake, Walter Graecen III, L. F. Brough, Marcus Prytherch, Horace B. Atkinson.

"We wish to extend our congratulations to B. D. Tallmany who is now Deputy Superintendent of the Department of Public Works of the State of New York. Mr. Tallamy, who was Chief Engineer of the Niagara Frontier Planning Commission, recently spoke to us on the subject of the St. Lawrence Seaway.

"It is with deep regret that we announce the passing of one of our members, Mr. John F. Connor on October 12, 1944. Word of his death reached us since the last meeting. Since January 1, 1944 Mr. Connor had been working at the Propeller Experimental Laboratory at Curtiss-Wright at Caldwell, N. J. Prior to that he was with the New York City Board of Water Supply at Downsville, N. Y."

OHIO

Reports From January Issue

The Ohio Engineer has arrived too late for the 15th of the month dead line twice in succession. What has happened Ohio? A necessary deletion makes room for the following excerpts which keeps the record for monthly Ohio news intact.

Editor's Column

4000 in '45

The Board of Trustees has taken the lead again. In 1943 "Beat New York in '43" was adopted as a membership slogan by the Board. The magic of that slogan did wonders. Now in the critical year of 1945 the Board has adopted another membership slogan, "4000 in '45".

As engineers we know that few things if any are impossible. We all know, for instance, that 4000 members in 1945 is possible. The Board has caught the vision of 4000 members in 1945. The big question is HAVE YOU CAUGHT THE VISION OF 4000 members in 1945!!

Just as soon as you have caught that vision someone else will catch it spread throughout our (over 2000) membership the goal of 4000 members in 1945 will look easy. With over 2000 members on this "4000 in '45" membership committee it will be "in the bag." Are you sold yet? Have you sold the idea to anyone else yet? Let's get busy right now in JANUARY AND START THE NEW YEAR RIGHT.

Board Meeting

The first Friday of the first month of a new year found the Board of Trustees starting off with a spirit of adventure and optimism.

Violations

Chairman Kennedy in his report commended Tom Dee of Akron for his work during the year in connection with the many violations which Chairman Dee had handled. Two cases are being considered for prosecution and he noted that the Executive Committee had advised him to stop further action pending study of our state law in the light of the Illinois case. The Board then passed a resolution presented by Vice President Habbard: "In view of the recent ruling of the Supreme Court of the State of Illinois relative to the constitutionality of certain features of the Illinois Registration Law the O.S.P.E. requests the National Society to immediately study so-called model Professional Engineers Registration Law and to suggest any changes in the language necessary to overcome the objections cited by the Illinois Court."

Executive Secretary

Chacey reported that "Past Member" lists had been brought up to date and that the membership increase for the month was 32, making a total of 2412. Chacey then followed through on President Rolph's suggestion that we have a membership slogan in 1945 by suggesting that the slogan be "4000 in '45." Chacey then told how the stage was all set for a great increase in membership. Hale, Smull, Hubbard, Kennedy, Moellenkamp and Graf all supported Chacey's contention and the slogan was adopted with a loud *"Yes."*

PENNSYLVANIA

Harrisburg Chapter

The following Engineers have recently been registered. All have been sent application blanks to join the Society.

William H. Corddry	600 N. 2nd St., Harrisburg
Richard J. Harman	222 N. 3rd St., Harrisburg
James O. Johnson	1523 N. 4th St., Harrisburg
H. H. Kamm	2344 Derry St., Harrisburg
Charles H. Kressler	1705 N. Front St., Harrisburg
William B. Leet	115 North St., Harrisburg
Charles E. Ryder	3215 N. Front St., Harrisburg
T. J. Kean, Jr.	14 S. 2nd St., already joined
George R. Britton	2216 Logan St., Camp Hill
Thomas B. McGrath	35 Spruce St., Middletown, Pa.
Robert G. Deitrich	39 S. 11th St., Sunbury, Pa.
H. LeRoy Mohn	705 Hepburn St., Milton
Gordon H. Pollock	223 Arch St., Sunbury
Benj. F. Shipman	24 E. 2nd St., Mt. Carmel, Pa.

Pittsburgh Chapter

Meeting on November 16, 1944

The Pittsburg Chapter had the privilege of entertaining the State President, Hale Sutherland, at the regular meeting of the Chapter. More than twenty-five engineers sat down at the pre-meeting dinner and the meeting was a success in every way.

President Sutherland conducted a round table discussion on the proposed new Registration Law. This brought out a lively discussion and a surprising unanimity of feeling apparently pleasing in sentiment to President Sutherland. The main points were: the inclusion of Surveying as an equal branch of engineering with all other Branches; the elimination of the Utility exemptions and the elimination of the all eligibility qualification of the members of the State Board except Registration with residence in Pennsylvania for a term of years.

WEST VIRGINIA

Parkersburg Chapter

The American Engineer is indebted to Corporal Dean Tabler of Camp Lee for the following news item:

"Leland G. Merrill, prominent city engineer, was elected president of the Parkersburg chapter of the West Virginia Society of Professional Engineers, for 1945, at a recent meeting.

Mr. Merrill will have as his cabinet members for the coming year, E. F. Speiden, vice-president; and Ernest Gant, secretary and treasurer.

President-elect of the West Virginia Society, Charles Snyder, of Fairmont, was the principal speaker of the evening. In his talk, Snyder pointed out the 'outstanding achievements of the United States in the present war were possible only through the genius and enterprise of the engineering profession in the designing, manufacturing and operation of infinite numbers of machines and equipment necessary to wage modern warfare.'

WISCONSIN

Registers New Engineers

The American Engineer acknowledges the courtesy of Josephine V. Hughes, Acting Secretary of the Wisconsin Registration Board, in forwarding the following list of recent registrants as Professional Engineers:

Edward R. Albert	Glen Ellyn, Ill.
George M. Anderson	Wausau, Wis.
Harold F. Falk	Milwaukee, Wis.
Willard E. Kemen	Milwaukee, Wis.
Robert H. Krone	Madison, Wis.
Robert E. Nelson	Milwaukee, Wis.
L. J. Markwardt	Madison, Wis.
Kenneth J. Rhodes	Milwaukee, Wis.
Arthur R. Segal	West Allis, Wis.
Randolph L. Smith	St. Paul, Minn.
C. A. Weis	Wauwatosa, Wis.
Thomas R. C. Wilson	Madison, Wis.

The Vanishing American

(*Continued from Page* 9)

It is extremely unfortunate—maybe the word should even be disastrous—as we approach reconversion and new products become vitally necessary to utilize our plant capacity and the manpower soon to be released, that such new products should be lacking and that invention has sunk to the lowest ebb it has reached during this century.

How Can We Apply the Oxygen Pump before Yankee Ingenuity Sinks Below the Possibility of Resuscitation

Why is the inventor given less "breaks" at law than the most criminal malefactor? Will changes in personnel alone bring about the restoration of confidence in our patent system?

How can we produce a more sympathetic attitude in the Patent Office and better understanding of problems of invention in the Courts?

Clarification of the laws and elimination of some of the loopholes may provide part of the answer. For instance, the need for authoritative definition of "invention" still exists and is still subject to the personal opinion—and at times, it would seem—the caprice—of the individual passing upon a particular case.

Might it not be better to abolish the requirement of "invention" and make the only test of patentability be novelty and utility?

Would it not help to eliminate purely technical rejections such as requirements of "division" based upon the Patent Office's arbitrary classification, and those based upon changes in claims (commonly called "estoppel")?

Would not simpler terms for defining inventions in the claims help (particularly where there is relationship between an article and a technique)?

Should not claims be sustained, especially where an idea is shown to have successfully solved a particular problem?

Should not protection be provided for the individual through which he may safely disclose his invention to prospective users?

Is there not need for clarification of shop rights and rights retained by employees?

Are appeals in the Patent Office of any value?

Certainly, many of our members must have views on the above and many other kindred questions.

Please express them to your Patent Committee, as it seems high time that the engineers, who are the ones most interested in invention, should advance a constructive program to offset the present destructive tendencies.

Address communications to Harvey R. Hawgood, Chairman, Patent Committee, National Society of Professional Engineers, 1137 *Leader Building, Cleveland* 14, *Ohio.*

Professional Development Of The Engineer

(*Continued from Page* 12)

Registration has established the identitfy of the engineer.

The relations of registration to the professional development of the engineer are suggested by such words as: education, experience, culture, ethics, responsibility, public trust, professional tradition, competence, and progress.

The professional development of the Engineer is evidenced by the examples of individual practice, dissemination of knowledge of engineering registration to the public and the strength and representative character of the engineers in this National Society of Professional Engineers.

As a closing thought the following quotation from Oliver Wendell Holmes may well be kept in mind by the professional engineer.

"I find the great thing in this world is not so much where we stand, as in what direction we are moving."

President Reports

(*Continued from Page* 14)

This progress has not been due to any one man. Members of this Board individually and as a Board, have spent much time and effort in behalf of the Society. For this year your president thanks you and requests continued support through the coming year.

I wish to take this opportunity to thank the chairmen of the committees and the members of the committees for the effective and intelligent work done. The success of our Society has been in no small measure due to the tremendous amount of work done by the officers, Board of Directors and individual members of the state organizations. Secretary Larson has been a great help to the president. He has spent many long hours discussing N.S.P.E. problems and planning for the future. Being the president of a growing organization such as N.S.P.E. is a real inspiration. With the help of all of you, we will make 1945 a better year than 1944.

A Valuable Schedule

(*Continued from Page* 19)

The minimum basic fee may be based on the Engineer's payroll cost plus 100% and plus traveling and sustenance expenses.

10. Fees for Legal Service

Fees for service in connection with legal proceedings shall be at the minimum rate of fifty dollars ($50.00) per day for the principal.

The minimum fee for testimony or appearance in court shall be fifty dollars ($50.00) per day or any part thereof.

11. Lump Sum Fees

The Engineer may charge a lump sum fee for his services.

Lump sum fees shall be based on the Engineer's estimate of the cost of the construction work and shall not be less than any of the minimum basic fees scheduled herein.

12. Non-compliance with the terms of these schedules will be considered as unethical practice by the Texas Society of Professional Engineers.

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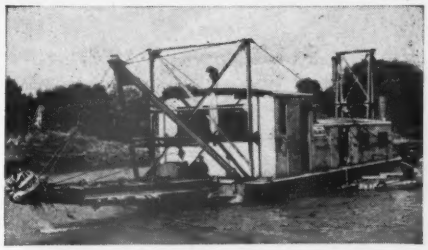

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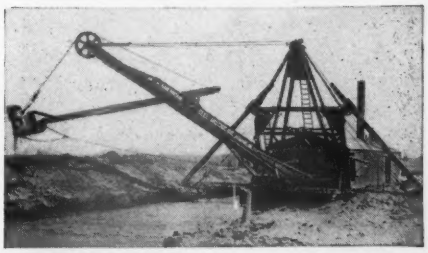
Size from 8 inches up



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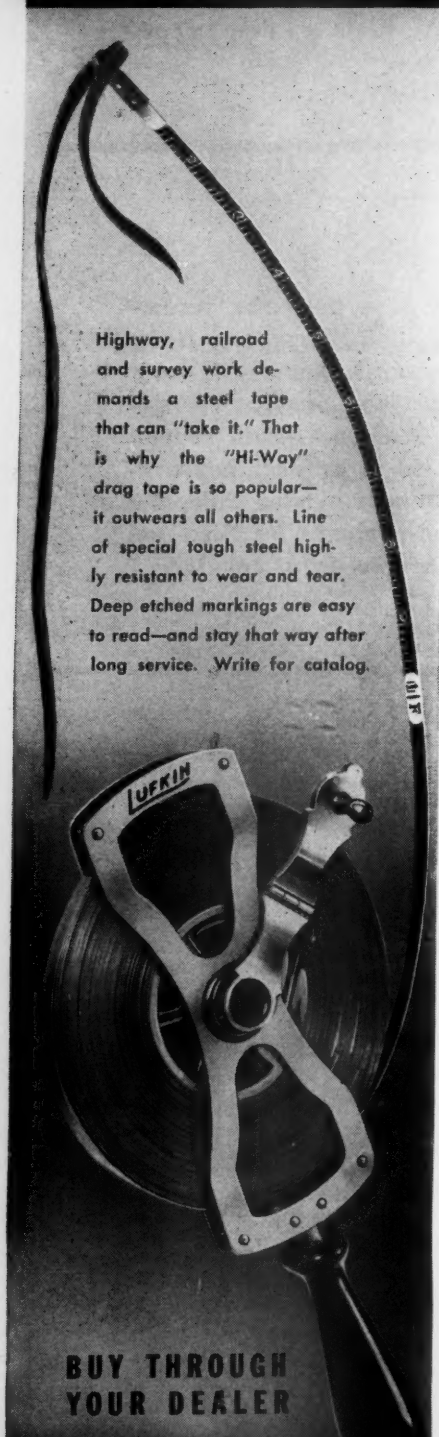

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WHAT'S NEW

And Coming In The Whirl Of Change

(News from industry — gathered by the publisher)

MAGNESIUM-ALUMINUM PRODUCTS AS DESCRIBED IN A NEW BOOKLET ISSUED BY Revere Copper and Brass Incorporated

For the present Revere is concentrating on four magnesium alloys. These alloys are available now in the form of sheet and plate, extruded rods, bars, forging stock, shapes and tubes, and forgings, but subject to prevailing wartime regulations.

Magnesium, the lightest of all commercial metals, will find a multitude of uses in the industrial America of the future. The virtues of alloys in which magnesium plate and sheet and extruded products in the form of rods, bars, forging stock, shapes and tubes, and forgings are already being manufactured assure advantages which no other metal provides.

Magnesium is one of the most abundant industrial metals found in the earth's crust and in the waters of the ocean.

Magnesium is 33 1/3% lighter than aluminum. Use of slightly larger magnesium sections provides equal or increased strength and stiffness, compared with other structural metals.

High fatigue resistance, exceptional free cutting, superior machining qualities are some of the advantages provided by magnesium alloys.

Above all else the light weight of magnesium alloys is a tempting challenge to the ingenuity and resourcefullness of all the metal working industries. Ever since mechanical power first became available for the use of mankind, inventive brains have struggled with the problems of conserving energy by lightening the weight of masses in motion. In airplane construction magnesium alloys have already found an all-important application because every pound of magnesium that can be used as a substitute for heavier metals adds to cargo-carrying capacity and extends the range of the airplane for every trip throughout its entire lifetime.

The many advantages of magnesium are obvious to every student of metals. The disavantages are few and some of them have been exaggerated in the public's mind out of all proportion to their importance.

Magnesium alloys are not "highly inflammable" nor are they explosive.

Because the public has learned that incendiary bombs contain magnesium, there is deep-rooted popular belief that the metal is liable to burst into flames at the slightest exposure to heat. Actually magnesium will not ignite at temperatures below 900° F — higher temperatures than those at which ordinary bituminous coal ignites. A few magnesium fires have occurred in chips and grinding dust when temperatures were allowed to get out of control, but safety measures are simple and effective.

As for explosion hazards, magnesium is no more dangerous than many other materials in common use. Finely divided coal dust, aluminum dust, or flour will explode under the same conditions as magnesium dust. Here again, common-sense precautions will eliminate all danger.

Magnesium alloys have higher resistance to some forms of corrosive influences than other metals, yet an idea persists with the public that the metal begins to disintegrate rapidly upon exposure to the atmosphere. Actually magnesium alloys are less vulnerable to atmospheric exposure than iron. Surface protection is easily afforded by coating with lacquer or paint, and a pickling process in manufacture renders the

(*Continued on next page*)

metal practically impervious to corrosive attack under conditions encountered in many ordinary uses.

Stress corrosion, set up by welding, and other processes can be overcome by relief annealing, as with other metals. In short, there is no unusually severe problem of corrosion encountered with magnesium except under conditions which can be avoided as with other metals in common use.

Economies provided by the light weight and excellent machinability have already proved to be outstanding, and their full measure is yet to be taken. The alloys now available can lay undisputed claim to the title of *"light weight champion of all metals."* Magnesium alloys may be machined at lower cost than any of the other structural metals, and with accompanying economy in tool costs and repairs, lubrication, and wear and tear of machinery.

One pound of magnesium produces 4½ times more volume of rolled or extruded metal than a pound of steel; 5 times more than a pound of copper; 1½ times more than a pound of aluminum. It follows that if you can replace one of those heavier metals with a Revere Magnesium Alloy, you can make from 1½ to 5 times as many units with an equal weight of material. Even if the cost of a pound of magnesium alloy is greater, the total cost of the finished unit may be less, for the economies afforded by these, the lightest of all structural metals, are far-reaching and accumulative.

These economies begin with transportation and handling, and apply in every phase of the movement of stock, from shipping and storage of raw material to delivery and use of the finished product. Economies due to light weight also play an important part in machinery investment, savings in human fatigue, savings all along the production line are positive advantages.

These potential savings, growing out of the weight factor alone, may prove to be far reaching in individual industries. We suggest study of the comparative weights table on page 14 and also careful consideration of all the physical and chemical characteristics of Revere Magnesium Alloys (see tabulations pages 25 to 28). Revere's research and engineering staff will gladly work with you to arrive at such further factual data as may be required.

Revere Magnesium Alloys provide one primary advantage — light weight — over all other structural metals. Their easy machinability and strength, in combination with their light weight, suggest a great variety of uses and important economies in the metal working industries.

The war emergency has brought about the most severe test of magnesium alloys imaginable — service in actual combat. Certainly the performance of the metals in war offers proof of the essential merits of this new material. Aircraft usage is a fortuitous test because the weight-strength ratio, above all else, is important in aircraft construction. The superb performance of magnesium alloys in combat planes is an exciting demonstration of their worth. *(Continued on next page)*

SAFE-LINE

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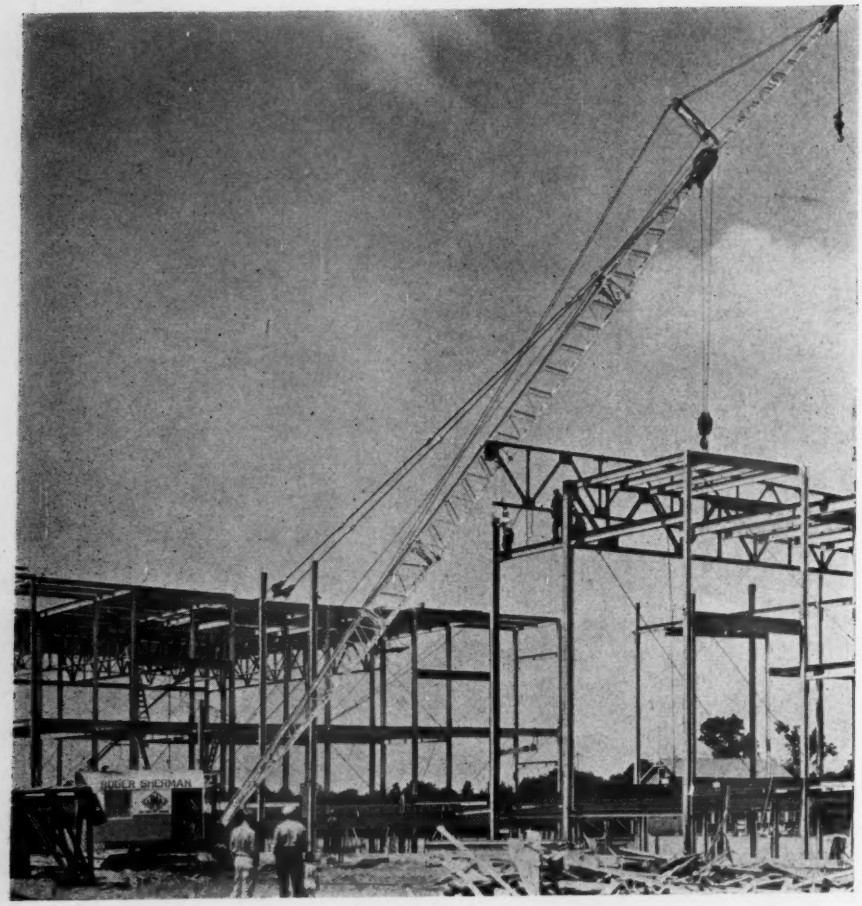

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In England and Germany, the use of magnesium alloys in construction of products other than aircraft is even farther advanced than in this country. In a majority of the applications abroad the advantage of magnesium's "feather weight" has received an enthusiastic welcome from industry and the public alike.

Replacement of heavier metals with Magnesium Alloys may involve certain changes in design. Where steel has been used because of its strength, a part made from magnesium alloy must provide a greater cross section. Strength increases in direct ratio to any increase in thickness, assuming constant width, but stiffness increases as the cube of the increase in thickness. Consequently, weight may be reduced, strength maintained and stiffness increased with greater resistance to bending, buckling and elastic deformation and stress.

The weight-strength ratio favors magnesium alloys—as do the ratios of weight-stiffness, weight-fatigue resistance, and other pertinent ratios in which light weight is the essential component.

Magnesium alloys are worked most easily and efficiently at slightly elevated temperatures, ranging from 450° to 650° F. Within that temperature range more can be done in forging, forming and bending operations than with other metals at room temperature. Changes in the routine of handling and working metals, such as use of heated dies and preheated metal, may be necessary to fabricate magnesium parts most efficiently. Hundreds of finished formed pieces per hour are no rarity. Added cost of equipment necessitated by hot working is offset by the elimination of spring back, and by the greater depth of draw. In addition, there are fewer intermediate steps necessary than in the cold working of aluminum alloy sheets, with resulting reduction in tool costs.

Every quality of Magnesium Alloys must be considered in relation to weight. Steel is stronger but more than 4 times as heavy. Duralumin is also slightly stronger but 1½ times as heavy. On a pound for pound basis, Revere Magnesium Alloys are twice as strong as duralumin and more than 14 times as strong as steel.

Light weight and the weight-strength ratio are the factors that created the enormous war-time demand for magnesium, and they are the factors that create the peace-time opportunities for far-sighted industries.

The outstanding advantage provided by Magnesium Alloys, aside from their light weight, is their excellent machining characteristics.

With Revere Magnesium Alloys most machines can be worked at their maximum speed. Performance records will prove quite astonishing to production men who are not familiar with these metals and their qualities. Light finishing cuts at a speed of 9000 feet a minute are possible, due to the low cutting pressure required. Heat generated by cutting is dissipated rapidly, and

(*Continued on next page*)

as a consequence cutting tools are not overheated.

Generally, these metals are machined without lubricants, though sometimes a coolant *other than water-soluble oil* may be advisable for high-speed work. Thus there is likewise an important saving in lubrication costs as compared to machine speeds of course insure greater production per machine hour, less wear work with heavier metals. High and tear on machines and tools, less power consumption per unit produced. The factor of power economy is augmented too by the light weight of Revere Magnesium Alloys. Since high-speed machines can turn out many more units per day than a machine geared for slow working, it is obvious that fewer machines are required to reach a predetermined production schedule. This may be translated into additional economy in machinery investment and maintenance, and likewise savings in space requirements.

For large unit operations the light weight of the magnesium alloys permits workmen to lift material without the use of power equipment. The use of magnesium alloy match plates in a foundry is reported to have reduced by 4000 pounds per day the weight that a single workman was lifting.

The machining characteristics of the various magnesium alloys now available show no important differences—surface cutting temperatures and cutting pressures being approximately the same for all alloys, so that the same cutting speeds and the same tools may be used irrespective of the alloy and the condition of the material.

Specific information on the machinability of Revere Magnesium Alloys is available upon request.

The ratio of strength, stiffness and weight to the thickness of Magnesium Alloys is easily visualized when compared with those qualities in steel and in a high strength aluminum alloy.

Despite their remarkable lightness, Revere Magnesium Alloys will provide strength equal to that of steel by the addition of only 15% to the thickness of a given section. To arrive at equal stiffness, the thickness of the magnesium section must be increased 65% over that of steel. But the advantage of the light weight of magnesium becomes strikingly apparent in the comparison of sections of equal weight. A magnesium section to weigh the same as steel would be nearly 4½ times as thick. Similar comparisons with a high strength aluminum alloy are shown on the chart.

When a given section of Revere Magnesium Alloy has the same thickness as a section of steel, the strength of the magnesium is 75% that of steel. When the stiffness of the two sections is equal, the strength of magnesium is more than double that of steel. The astonishing com-

(*Continued on next page*)

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parison, however, is in the relative strength of steel and magnesium alloys when the weight is equal.

THE DOUGH YOU BLOW —will bring U.S. woe!

What a boom we were handed by World War No. 1! Money came easily—went easily. Everybody was splurging on everything—from silk underwear to diamond sunbursts. Prices went skying. Sugar eventually hit 28¢ a pound!

Bye-bye, boom. Factories closed; me laid off. Prices and wages sinking fa Wish we'd banked some of that doug we'd blown a few years back! With job scarce, that money would have come i mighty handy, then.

Prosperity. Stocks up fifty points in a week. Again everybody was buying everything—yachts, jewelry, stocks, real estate, regardless of cost. Depression? Phooey . . . we thought we'd found a way to lick depression.

Or had we? Bread lines, apple venders. WPA. "Brother, can you spare a dime?" No jobs. Prices dropping. Wages dropping. Everything dropping—except the mortgage on the house. "What goes up must come down."

We're splurging again. Americans have been earning more money. But even today there are fewer goods to spend it on—so naturally prices rise. We must keep them in check. DON'T LET *IT* ALL HAPPEN AGAIN!

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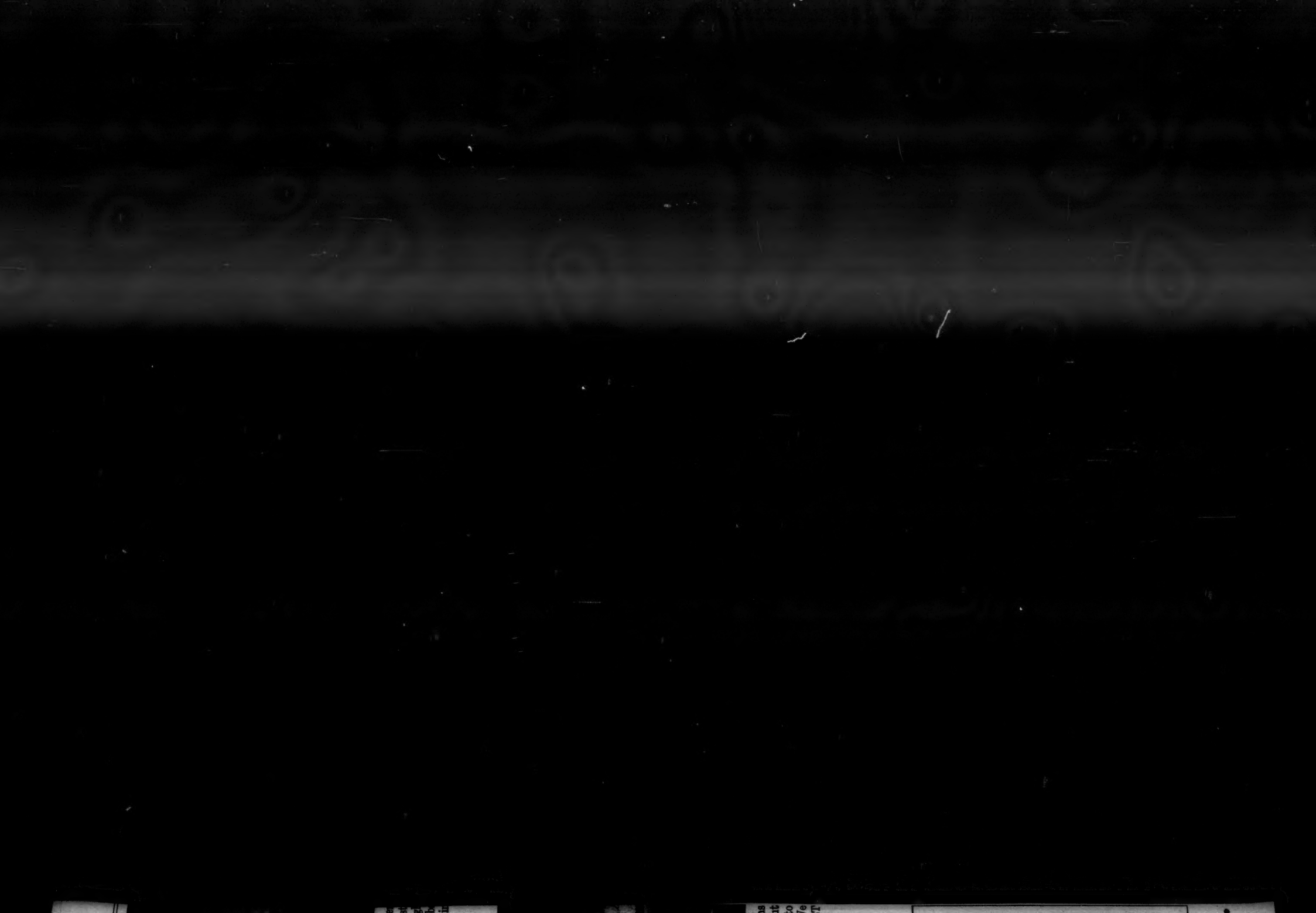
4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than the ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

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